

cycles

—A MONTHLY REPORT

January 1953

FOUNDATION FOR THE STUDY OF CYCLES
New York, New York

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Edward R. Dewey, Director

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cycles

—a monthly report

*The Official Bulletin of
the Foundation for the
Study of Cycles*

VOLUME IV NUMBER 1 JANUARY 1953

The Director's Letter

Dear Member:

Will you forgive me if I repeat a few words from my letter of June 1950?

In that letter I said:-

Something Deeply Hidden

Albert Einstein, speaking of wonder, said ".....as a child of four or five years.....my father showed me a compass. That the needle behaved in such a determined way did not at all fit into the nature of events which could find a place in the world of cause and effect connected with direct 'touch.'

"This experience made a deep and lasting impression upon me. Something deeply hidden had to be behind things."

Something of Einstein's wonder and curiosity came over me when, as a boy, I first saw iron filings on a sheet of paper conform to the "lines of force" of a magnet held underneath.

Behavior Arouses Curiosity

It is this same "determined way" in which many phenomena fluctuate with rhythm that tells us that "something deeply hidden has to be behind things." It increases our wonder when we see a number of phenomena all fluctuating with the same wave-length, and with turning points coming at or about the same time. These behaviors arouse our curiosity in regard to what are the deeply hidden "somethings" involved. It is this curiosity that drives forward the student of cycles,--this curiosity and a compulsion that makes it impossible for him to put down his task until he has solved at least a part of the riddle.

Along the same lines I would like to quote a passage from **Broadway**, a book by J. B. Kerfoot, published in 1911 by Houghton Mifflin and Company. The passage reads:-

Even on the clearest night in summer, if you stand on the corner of Broadway and Forty-second Street it is impossible to see the stars.

May it not be salutary for us to remember, at times, that Broadway itself is probably invisible to, say, the keenest observers on the satellites of Sirius?

Mr. Chesterton, who is fond of exploding bits of unexpected truths so that they sound like hyperbolic blank cartridges, has said somewhere that in all the relations of life, the only thing that really matters is a man's attitude toward the cosmos.

A pale-faced man, stretched on a cot in one of the city hospitals, to whom the chaplain of the ward had just been speaking, once said to me, "You can say what you like, but heaven is a long way from Broadway."

On the other hand, a certain citizen of Gotham died and was buried.

And, at first, when he came confusedly to himself, his senses were obfuscated with the notion that he must, once again, have been making a night of it.

But when the eyes of his spirit began to clear, he saw that he was in a strange country. And as he looked about him his gaze fell upon an open doorway. And within

he saw a Being, surrounded by strange instruments, gazing into what might have been a microscope.

And he said to the Being, "What are you doing?"

And the Being answered, "I am seeking."

And he said, "For what?"

And the Being answered, "God knows."

And when the newcomer had thought on this for a moment he said, "Why, then, do you seek?"

And the Being answered, "There is nothing else to do."

At that the stranger made bold to enter the doorway and to ask, less hesitatingly, "What are you looking at?"

And the Being answered, "At a drop of juice from the body of a bug."

And he asked, "Is it a rare bug?"

And the Being answered, "Its numbers are a pest."

And he asked, "Where did you get it?"

And the being answered, "From the stalk of a weed in my kitchen-garden." And he added, "Come and look."

And when the stranger had looked into the lens, he saw the sun and the stars and all the uncounted orbs of heaven, very small and scarcely to be made out, moving in a crystal liquor. And, bewildered, he asked, "What is it?"

And the Being answered, "The leucocytes in the blood of a bug."

And the newcomer, when he has looked again into the lens, raised his head and said, in an awe-stricken voice, "Are you, then, --God?"

And the Being laughed outright and said, "I am but a poor Being like the rest of my race, who knows not whence he came, or whither he is going, or if God lives."

And when he had pondered this, he that had been a citizen of Gotham said to himself, "If these things be so; if the earth and her sister-planets, the sun, the dog star and their myriad brothers of the Milky Way, are but corpuscles in the blood of an unconsidered insect from a neglected corner of the kitchen-garden of a Being who himself knows neither whence he came nor whither he is bound nor if God lives, is it not possible that sometimes, on Broadway, we took ourselves too seriously?"

* * *

The Effect of the Elections

This letter will reach you just about the time General Eisenhower is to be inaugurated as our new President. What effect will this event have upon general business and upon the stock market?

Some effect, of course, but nowhere nearly as much as many people suppose.

Business acts as if it fluctuated, at least in part, in response to rhythmic cyclic forces. The nature of these forces is as yet unknown, but the rhythmic results are clearly observable. In many instances these rhythms have continued for years and years after discovery.

It should go almost without saying that if any given fluctuation is the result of natural environmental or dynamic forces, they cannot be laid at the door of either businessmen, or financiers, or politicians.

Gain-Loss Ratio of 31 to 1

For example, in 1875, Samuel Benner observed a 9-year cycle in pig iron prices. He predicted that this cycle would continue and that it would cause a low at or near various dates including 1931 (see my report for February 1952). Buying and selling on the basis of Benner's forecast would have shown a gain-loss ratio of 31 to 1 over a period of 77 years. A fulfillment of this sort cannot have come about by accident.

If the low prices of 1931 and 1932 were the result of cyclic forces they cannot have been the result of political forces. To blame or praise our politicians for the rhythmic fluctuations of business is as foolish as the comment of the woman from a drouth stricken area of Texas who said, a few days after the last election, "Eisenhower won, and do you know, the very next day it rained!" So what!

"Eisenhower won--business 'boomed!'" "Eisenhower won--business 'bust!'" Likewise, so what!

This is not to say that political actions do not affect business. A decision to rearm for example, or not to rearm, might in itself be enough completely to upset the normal cyclic behavior. However, it seems clear that many of ups and downs of the past have been falsely attributed to the political party in power. When, oh

Lord, will we learn not to blame or credit our Hoovers, our Roosevelts, our Trumans, and our Eisenhowers for our economic climate?

What I have just said about our politicians can also be said about our businessmen. They are not economic rain or economic sunshine makers either, popular notions to the contrary notwithstanding.

* * *

Cycles in Landslides

Speaking of elections, you will be interested to know that a cycle in political landslides was discovered by Dr. Stuart A. Rice as far back as 1928. Dr. Rice's landslide studies covered elections for governor for New York, New Jersey, Pennsylvania, and Ohio. They cannot safely be projected to the country as a whole. However, for gubernatorial election in these four states they showed a clear cycle of 10 years in length with peaks in the second year of each decade. The year 1952 was due to be a landslide year.

I wanted to write an article for you about Dr. Rice's work to appear prior to the election, but other matters prevented.

A Political Forecast Which Came True

I did, however, on January 17, 1952, manage to issue a press release which was rather widely printed and which you may have seen. It read as follows:-

"If past election results in the four key states of New York, Pennsylvania, Ohio, and New Jersey are indicative, 1952 should be a year for political landslides, according to Edward R. Dewey, Director of the Foundation for the Study of Cycles.

"Mr. Dewey pointed out that the analysis carried no inferences relating to either the Republican or Democratic parties and covered only the voting figures for the gubernatorial elections in the above four states.

"Starting with figures dating as far back as 1850 a combined index based upon election returns for these states points toward a definite 10-year cycle in landslides with the peaks coming in the early years of each decade," he explained.

"Research work on which his conclusions are based was conducted by Walter E. McDonald of the University of Pennsylvania and published in a book by Dr. Stuart A. Rice, 'Quantitative Methods in Politics.'"

Very cordially yours,

Edward R. Dewey

Director

Research

Periodic Geysers

Summary

Geysers, many of which erupt at periodic intervals, occur when pent up forces build up to the point of explosion, find relief, and then build up again to complete the cycle. They illustrate one way in which cycles in business, in wildlife, in war, and in other phenomena could occur.

A NUMBER of Geysers erupt at periodic intervals. In this country the most famous of these is Old Faithful, so called because of the extreme regularity of its eruption. It is pictured below.

Old Faithful does not erupt "every hour on the hour," as has been said, but it is remarkably regular notwithstanding. Here is the record, as far as it is available, from 1870 through 1947.

The table below was prepared by Dr. Philip E. Fix of the U.S. Geological Survey in an article called "Regularity of Old Faithful Geyser, Yellowstone National Park, Wyoming," which appeared on page 246

of the *American Journal of Science* for April 1949.

Dr. Fix goes on to say:-

"The relative regularity of Old Faithful Geyser is so astonishingly great for the period 1870-1947 that the world-wide fame accorded the geyser is deserved beyond equivocation, but the common belief that Old Faithful is the only regular large geyser in Yellowstone is incorrect. The degree of the regularity of several other large geysers over long periods of time is not known accurately because their lesser fame has resulted in even fewer written records than for Old Faithful. The Riverside Geyser in the summer of 1937 showed a regularity greater than that of old Faithful: Valentine Geyser in the summer of 1936 erupted with a regularity comparable with that of Old Faithful, but there have been long periods of time before and since when it was irregular or inactive because of interference from its neighbors. Daisy Geyser and several others are known to have been relatively regular over long periods also...."

YEAR	OBSERVER	NUMBER OF ERUPTIONS SEEN	INTERVAL		AVERAGE PERIOD
			MINIMUM	MAXIMUM	
1870	DOANE	...	...	...	50M.
1870	WASHBURN	...	...	...	60M.
1872	PEALE	17	65M 00s	70M 34s	67M. 54s.
1873	COMSTOCK	11	52M 05s	77M 35s	63M 48s
1875	DANA AND GRINNELL	24	...	...	65-66M
1877	SHERMAN AND POE	7	62M	80M	67M
1878	PEALE	97	54M 04s	78M 00s	65M 06s
1879	MITCHELL	...	...	...	70M
1879	SEGUIN	...	...	...	45M
1883	HALLOCK	...	...	...	65M
1928	ALLEN AND DAY	6	57M 30s	74M	...
1928-9	BAKER	38	58M 20s	75M	...
1932	ROBERTSON	1187	38M	81M	65.7M
1937	FIX (JULY 17)	2	...	84M	...
1937	FIX (AUG. 25-SEPT 3)	23	42M 58s	79M 47s	67M 38s
1938	WOODWARD	771	...	...	66M 30s
1939	U.S.N.P.S.	500	40M	86M	66.1M
1940	U.S.N.P.S.	1075	39M	87M	67M
1941	U.S.N.P.S.	1577	38M	91M	66.3M.
1942	U.S.N.P.S.	1452	41M	90M	60.05M
1943	U.S.N.P.S.	376	39M	84.5M	63.45M
1945	U.S.N.P.S.	940	39M	85M	63.77M
1946	U.S.N.P.S.	1495	34M	86M	63.2M
1947	U.S.N.P.S.	1500	39M	89M	63.3M
1870-1947		11098	34M	91M	65.12M



OLD FAITHFUL—YELLOWSTONE NATIONAL PARK

From another source¹ we learn:

"...**Valentine Geyser** is the highest in the basin (Norris), averaging 75 feet at 18-hour intervals...."

1. **Wyoming, A Guide to Its History, Highways, and People.** Writers' Program, New York: Oxford University Press, 1941.

"**Great Fountain Geyser**...near the south-east border of Lower Geyser Basin, has an average height of 100 feet, with an interval of from 8 to 12 hours..."

"**Artemisia Geyser**...has a large central crater of blue...This geyser, named for the sage-colored sinter, sends a shaft of water up to 35 feet for 10 to 15 minutes

every 24 hours....

"**Riverside Geyser**, characterized by one of the most unusual cones in the area, has a beautiful eruption, lasting a half-hour, during which it throws water obliquely from the lower crater for a distance of 75 feet, at an angle over the river....The period between eruptions varies from five and one-half to eight hours...

"**Daisy Geyser**, a buggling pool, one of the most famous in the park (Yellowstone), erupts at an angle away from the road. A partial vacuum sucks water back into the tube, to be flung out again. The Daisy erupts, at intervals of 90 to 100 minutes, to an average height of 75 feet...

"**Cliff Geyser**, about 500 feet north of Emerald Pool, plays at one-hour intervals from 50 to 60 feet....

"**Sawmill Geyser**...erupts to 20 feet every three hours..."

The new International Encyclopaedia tells us that **Excelsior**, which has a basin 200 feet in diameter, spouts at intervals of eight years.

Of course, you are best acquainted with American geysers, but other parts of the world have geysers too, notably Iceland and New Zealand.

In Iceland the most famous of the geysers is the Great Geyser which appears in its calm periods as a circular pool 60 feet in diameter and 4 feet in depth. It also erupts at periodic intervals. According to the Encyclopaedia Britannica, in 1809 and 1870 its columns were 90 or 100 feet high and rose at intervals of 30 hours, in 1815 the altitude was from 80 to 150 feet and the intervals were six hours.

"Geysers do not last forever," according to E. S. Grey in the *Illustrated London News* of August 1, 1942. Grey goes on to say, "After centuries of work, the Great Geyser's boiler began to show signs of fatigue. It needed a hundredweight of soap to stimulate it to activity and at last went out of business altogether. It was left to an Icelandic policeman, Jon Jonssen, to revive it, and to show the force of von Bunsen's diagnosis. Jonssen had emigrated to the United States when a youth and came back after the war with a good scientific knowledge of geysers. He set to work to find out the trouble of the fountain of his childhood, and at once

perceived that the basin receiving the first discharge of water was too big, and cooled the supply too much. He made a channel in the rim and halved the water surface.

"The basin water now remained on the boil when it came up, and descended still boiling to the cistern below, where it now received the necessary kick to spout up in a fountain as high as ever. The trick was done; the old geyser renewed its mighty youth, and now spouts regularly about every 15 hours. A few bars of soap will keep it up to time for any party of visitors who, having given notice, visit the hostel farm..."

As stated in *Glimpses of Our National Parks* by Isabelle F. Story, "The actions of the geyser is comparatively simple. Water from the surface or from subterranean sources collects in the bottom of a deep tube-shaped opening in the rocks. This opening which has been enlarged from a crevice by the dissolving action of heated waters charged with sulphur gases, is known as the geyser tube. The water in the bottom of this tube is heated by hot gases rising from below or by contact with heated rock, but because of the weight of the column of cooler water in the tube above, it does not form bubbles of steam although it is heated much above the boiling point. The hot water gradually rises until the entire column of water becomes heated and the water near the surface, which is under less pressure, begins to boil causing a certain amount of water to overflow the rim of the geyser. This relieves the pressure on the superheated water below which immediately bursts into steam and boils over.

"After the eruption the water re-collects in the tube, to become heated and again to be expelled. The geyser is thus periodic in its action."

Geysers illustrate one way in which rhythmic behavior can be brought about. Pent up forces build up to the point of explosion. They then find relief. Then they build up again to complete the cycle.

This sort of thing could happen in business, in wildlife, or in any one of a variety of phenomena.

However, no matter what the cause, if we have regularity we have predictability.

erd

The 6-Year Cycle In Cotton Production

You will be interested, I think, to read an article on the cycles in cotton production which I wrote about four years ago on the basis of cotton production figures through 1947.

I am publishing this article below together with the charts that accompanied it.

Chart 1

To Chart 1, the original data, I have added values for 1948, 1949, 1950, 1951, and 1952 (preliminary).

Chart 2

Chart 2 plots a 2-year moving average of the values in Chart 1. A 2-year moving average always loses one value at each end of the series of figures. As originally drawn, therefore, Chart 2 ran only through 1946. I have added the 2-year moving average values for 1947, 1948, 1949, 1950, and 1951. The point in Chart 2 for 1952 cannot be added until figures for 1953 are available. Figure 2 also shows by means of a broken line a 6-year moving average. A 6-year moving average loses three values at each end of the series. Originally, therefore, the last value plotted was for 1944. Now that figures are available for

1952, it is possible to bring this moving average up through 1949 by adding points for 1945, 1946, 1947, 1948, and 1949. I have done this.

Correct values of the moving average for 1950, 1951, and 1952 have to await actual figures for 1953, 1954, and 1955.

However, for interim purposes I have made a guess as to what these values might be so that Chart 3, which compares the two curves in Chart 2, can be brought up to date.

Chart 3

In Chart 3 I have added the correct values for 1945, 1946, 1947, 1948, and 1949, and the estimated values for 1950, and 1951. (The value for 1952 cannot be plotted until we can get the 2-year moving average for 1952. As I said above, this two year moving average cannot be obtained until we have proper production figures for 1953.) These additions to the charts will enable you to see how the 6-year cycle has worked out in the five years that have elapsed since it was first discovered in these figures.

The article which I wrote before I saw even the figures for 1948 is reproduced unchanged below:

erd

WHAT IS AHEAD FOR COTTON PRODUCTION?

By Edward R. Dewey

DIRECTOR, FOUNDATION FOR THE STUDY OF CYCLES

How many bales of cotton will be produced in 1949, 1950, and 1951? It is a bold man, and a foolish one, who would venture to say. Yet there are some people who are forced by circumstances to make estimates. I would like, therefore, to present herewith certain facts that can probably be very helpful to such people.

Trend of Cotton Production Downward

Production of cotton, in thousands

of 500 pound bales, by crop years from 1900 to 1947, the last figures available to me, is shown in Chart 1 by a solid line.

Chart 2 shows by a solid line these same figures slightly smoothed by a 2-year moving average trend. It is clear that since about 1929 the trend has been downward.

A Regularly Recurring 2-Year Pattern

Reference to Chart 1 shows that since

COTTON PRODUCTION, 1900-1947 (Crop Years)

(Thousands of 500-Pound Bales)

Chart

Original Data

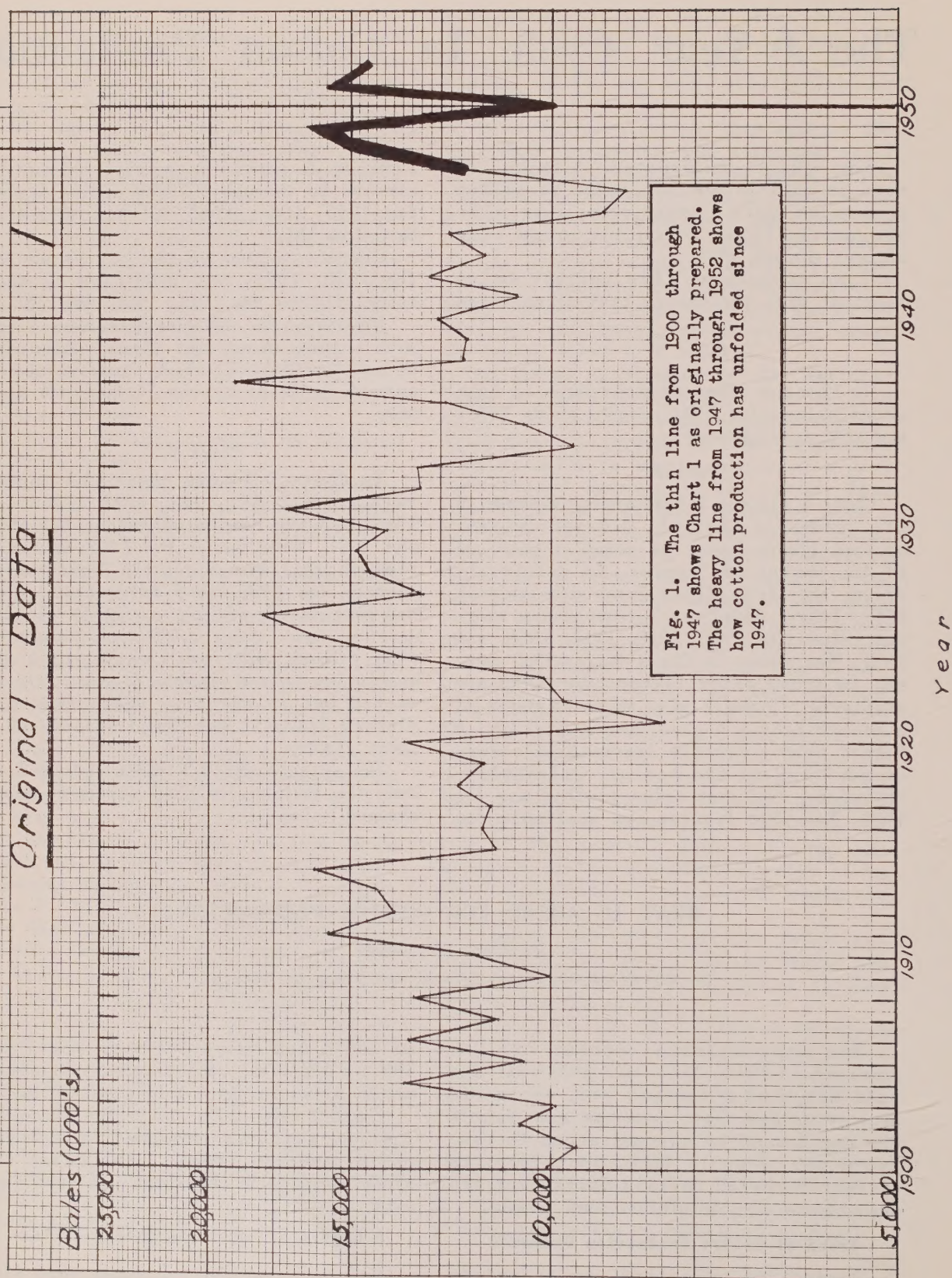


Fig. 1. The thin line from 1900 through 1947 shows Chart 1 as originally prepared. The heavy line from 1947 through 1952 shows how cotton production has unfolded since 1947.

COTTON PRODUCTION, 1900 - 1947 (Crop Years)

Chart

2

Data Smoothed

Bales (000's)

25,000

20,000

15,000

10,000

5,000

1900

1910

1920

1930

1940

1950

Year

— 2-Year Moving Average
of the Figures--- 6-Year Moving Average
Trend of the Figures

Fig. 2. The thin line from 1901 through 1946 shows Chart 2 as it originally appeared. The heavy line from 1946 through 1951 shows how the smoothed figures have unfolded. The 6-year moving average trend has also been continued from 1944 through 1949 and estimates made for 1950 and 1951.

1900 there has been a tendency for production to be greater in the even years than in the odd years which precede them. Out of the 24 even years from 1900 to 1947, eighteen, or 75 per cent, have shown this characteristic.

In addition, since 1900 there has also been a tendency for production in odd years to be less than production in the even years that come immediately before. In this case, however, the decline comes in only fifteen out of 25 possible cases.

Such a 2-year swing could be due to random influences, and the fact that it is not particularly apparent prior to 1900 strengthens the argument that it occurs by pure chance. Whether or not the pattern will continue, only the future can tell.

In the meantime, it is interesting and perhaps significant to note that, if the pattern continues to be dominant in the future as it has since 1900, the odds are three to one for rises in 1948 and 1950, and three to two for declines in 1949 and 1951.

A Regularly Recurring 6-Year Pattern

Since about 1907 there has been a definite tendency for production of cotton to go up and down in a regularly recurring pattern that is six years from crest to crest. Three years up—three years down. Three years up—three years down. This is in addition to the shorter 2-year pattern mentioned above. There are hints of a 6-year rhythm all the way back to Civil War days, but the pattern is neither conclusive nor important in the earlier years. There is, however, reason to think that it is present and of greater consequence in cotton **prices** than in cotton **production**.

This pattern also could be the result of chance, but there are good reasons for thinking it may be significant. Many series of industrial figures—some of them going back much farther than 1907—show this 6-year behavior with crests coming at about the same time as the crests in cotton production. Also, patterns of similar length have been discovered in solar activity, in the thickness and thinness of successive tree rings, and in climate. Unfortunately, enough work has not yet been done to see whether or not there is any interrelation between them.

Chart 3 shows this repetitive 6-year pattern in cotton production. The solid line on Chart 3 represents the 2-year moving average expressed as a percentage of the 6-year moving average trend. I have also added, by means of a broken line, a perfectly regular 6-year pattern for purposes of comparison.

A Word of Caution

Just as the ocean tides can be overwhelmed by a hurricane, even though the tidal force continues, so also the repetitive 6-year pattern in cotton production can be overwhelmed or modified by other forces. Assuming that the pattern is still operating, it will be modified by the influence of the underlying growth trend and by the influences of other regular patterns and non-recurring events that may also be reflected in the figures. Therefore, each of these factors must also be evaluated before one can venture to predict cotton production.

Characteristics of the 6-Year Pattern

Note that because the top of the 6-year pattern falls in **odd** years, and the low in **even** years, the pattern appears only when two consecutive years are averaged. (It will be remembered that odd years are characteristically **low** and even years characteristically **high**.) Do not expect therefore, that 1949 by itself will necessarily be a high. But if the pattern continues, it is likely that average production for the two years centering on 1949 will be high. This average is based upon one-half of the bales for 1948, plus the bales for 1949, plus one-half of the bales for 1950, and smoothes the data in the manner shown earlier by the solid line on Chart 2.

Generally speaking, since 1900 the decline in the successive 2-year averages during the three years from the top to the bottom of the 6-year wave has amounted to 16 per cent. Based on estimates of 1949 average production, this represents a decline of 1,900,000 bales.

It is obvious that we are discussing behavior which, if it continues, is of great importance to those who need to know the future of cotton production in the United States.

6-YEAR PATTERN IN COTTON PRODUCTION

2-Year Moving Average Expressed
as a Percentage of the 6-Year
Moving Average Trend

Chart
3

--- Diagrammatic Representation of
a 6-Year Repetitive Pattern

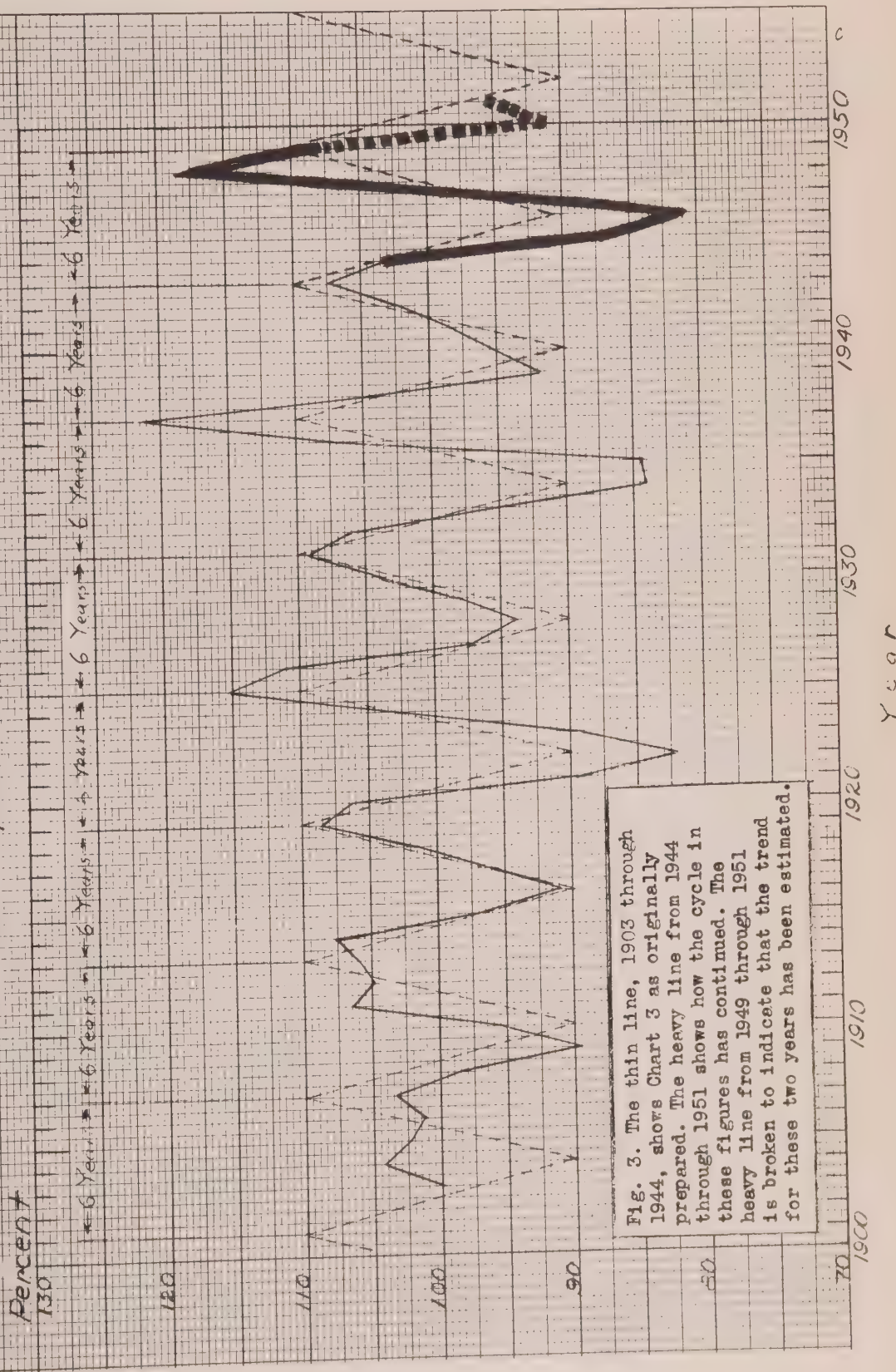


Fig. 3. The thin line, 1903 through 1944, shows Chart 3 as originally prepared. The heavy line from 1944 through 1951 shows how the cycle in these figures has continued. The heavy line from 1949 through 1951 is broken to indicate that the trend for these two years has been estimated.

Foundation Affairs

Our College Program

IF you want people in general to understand the significance of cycles you must start in the colleges. The professors must understand the wider significance of cycles. The textbooks must include adequate references to cycles. The students must be taught how to isolate, evaluate, and project cycles. In other words, cycles as a single integrated science must become part of the web and woof of natural and social science.

Until this is done, any effort to make the man in the street realize that the ups and downs of business may be due to fundamental natural forces rather than the capitalistic system, or business men, or government—or lack of government—will be like snow on wet ground.

Let me give you an analogy. Suppose you had found out it was really true that corn seed treated with picric acid yielded 10% more than corn seed treated any other way. You could shout your head off for 20 years and nobody would pay much attention to you. On the other hand, if this method were accepted by the agronomists and taught in the state colleges and universities a generation from now everybody would understand it, and act upon it. The yield of our corn crop would be increased by 10%.

It seems to me imperative then, that if we are to accomplish anything of significance in connection with cycle study we must start at the bottom and build up no matter how slowly, rather than try to start at the top and build down.

The horizons of many scientists are limited by their own specialty and this is particularly true when they study cycles. The ordinary biologist, for example, thinks of the cycles of animal abundance as purely biological manifestations. He does not realize that the cause may be climatological. The climatologist observes cycles in weather but, as a rule, does not realize

that the cause may be solar. The astrophysicist observes cycles in the sun but does not realize that the cause may be cosmic. A few economists observe cycles but almost without exception they consider these cycles to be accidental behavior without significance. Only a few of the very ablest scientists share the conviction that the cause of the cycles which they study may lie outside of the field of their own special competence.

The concept of cycle study, as such, irrespective of the field of science, has not yet made much of a dent upon the professional scientists. Of course this fact is our fault because neither we, nor anybody else, as far as I know, has ever suggested the concept to them.

Moreover, scientists do not know how to make thorough cycle analyses of their own data. This perhaps is not their fault either, because cycle analysis is a very special subdivision of statistics, and no one has ever taken the trouble to spell it out for statistical laymen in words that they can understand. And biologists, geologists, doctors, economists and botanists are sometimes a bit weak on an aspect of statistics which is foreign even to some statisticians.

The Foundation for the Study of Cycles was created not only to study cycles but to act as a clearinghouse among scientists in order to enlarge their horizons and to create a separate science devoted to cycles per se.

Our first step in this direction was the publication of a Directory (now out of print) listing students of cycles in various fields of natural and social science.

A second step was taken when we inaugurated our scientific membership plan whereby scientists who have contributed to the fund of knowledge with respect to cycles,

rhythms, and periodicities are accepted as members of the Foundation.

A third step was the inauguration of the Journal of Cycle Research. The Journal now goes free to all scientific members of the Foundation and, on request, to over 400 college libraries here and abroad.

A fourth step was the creation of full time fellowships to enable suitably qualified college professors to study cycle analysis at Foundation headquarters. Dr. Leonard W. Wing, Professor of Wildlife Management at Texas A. & M. is the holder of the first fellowship. A suitable candidate is now being sought to receive a second fellowship for the summer vacation of 1953. Finances permitting, a third fellowship will be offered for the college year 1953-54.

The fifth step, finances permitting, will be the granting of fellowships to graduate students who expect to enter the field of teaching so that they can work in the field of cycle analysis under suitable direction at colleges of their own choosing.

Finally, as the sixth step in the program we plan, finances permitting, what the college professors call "workshops"—group meetings at the various colleges to teach the professors how to make cycle analyses of their own data.

By these various steps, and others to follow, we hope to integrate such scientific work in the field of cycles as is now being done, and to stimulate further research and investigations on the part of qualified students, both here and abroad.

erd

The Membership Plan

Membership in the Foundation for the Study of Cycles continued to grow. At the beginning of 1952 we had 1,011 contributing members. On December 1st we had 1,275

If you want to know how the lay membership plan started, and how it changed and developed during the years, you may wish to read an article on this subject published on pages 153 and 154 of the April 1951 report.

You may be interested to see how the plan has grown from 1943 to date. Here are the figures:

With your help we are really going to get somewhere!

erd

Dues and Contributions from Lay Members and Associates 1943-1951

Year	Amount	Increase	
		In dollars	In per cent
1943	\$ 396.00	\$ 396.00	---
1944	909.45	513.45	130%
1945	1,470.87	561.42	62%
1946	2,175.23	704.36	48%
1947	2,888.28	713.05	33%
1948	3,024.09	135.81	5%
1949	4,235.62	1,211.53	40%
1950	7,757.69	3,522.07	83%
1951	13,356.81	5,599.12	72%

Data

Standard and Poor's Corporation INDUSTRIAL Stock Price Index January 1871—November 1952

AT Foundation Headquarters all our stock market work is based on the Standard & Poor's Corporation Indexes. The following table, published through

the courtesy of the Standard & Poor's Corporation, gives average monthly stock prices of INDUSTRIAL stocks, January 1871-December 1951.

INDUSTRIALS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Avg.
1851..	182.6	182.6	184.4	187.3	189.3	186.9	188.1	196.3	205.2	202.3	193.3	199.1	198.3
1860..	142.6	144.4	146.5	150.0	156.1	157.6	147.3	155.0	163.3	170.7	168.8	171.3	158.4
1949..	127.3	127.7	123.7	124.2	123.5	117.0	128.9	138.0	130.3	134.4	136.5	140.3	127.8
1948..	126.0	119.2	121.5	130.8	136.0	142.7	138.9	133.5	131.7	134.3	136.4	125.3	130.6
1947..	128.5	132.6	127.7	123.1	119.0	124.1	131.7	130.2	128.4	131.1	130.3	129.2	128.0
1946..	147.5	145.9	144.5	155.9	158.8	156.0	153.4	150.4	129.8	125.9	123.8	128.9	143.4
1945..	110.4	115.2	114.0	116.5	120.3	121.5	118.8	118.9	128.2	134.5	138.7	142.7	123.3
1944..	96.4	95.3	96.2	96.5	99.0	103.9	106.7	104.7	102.6	105.0	104.6	108.4	101.7
1943..	82.3	87.7	90.3	93.7	97.2	98.3	100.9	94.3	97.5	96.0	98.0	93.6	94.1
1942..	74.3	71.0	67.3	64.8	64.7	68.2	70.5	70.3	71.6	70.5	77.2	78.5	71.3
1941..	84.7	79.4	79.6	77.3	77.3	79.7	81.3	84.3	84.9	81.6	73.0	73.8	80.4
1940..	97.7	97.1	97.3	98.7	95.3	77.3	79.3	80.3	84.6	85.4	86.6	84.9	87.9
1939..	98.7	96.0	96.6	85.1	88.3	88.9	91.8	90.4	101.3	101.8	99.6	97.5	94.3
1938..	87.7	86.5	80.7	78.0	78.9	80.9	86.9	97.0	92.7	101.2	102.1	100.0	90.1
1937..	132.6	137.1	137.4	128.8	123.9	120.7	127.5	129.6	112.4	94.8	86.8	85.1	118.1
1936..	104.8	109.7	112.6	110.9	105.8	108.9	113.1	115.9	117.0	124.1	130.4	129.1	115.2
1935..	73.6	72.2	69.2	71.3	77.3	79.5	82.3	86.0	88.1	89.8	99.0	99.2	83.3
1934..	75.8	70.8	76.7	79.7	71.9	73.5	72.0	69.2	66.4	69.0	72.4	72.5	73.1
1933..	41.7	38.4	37.6	44.1	50.0	60.8	75.4	71.3	73.9	65.2	69.3	71.2	59.9
1932..	49.1	47.8	48.6	37.7	34.4	30.2	32.2	46.5	59.4	43.1	41.0	40.4	41.8
1931..	93.4	99.7	101.0	90.6	80.8	78.2	81.1	79.9	65.5	58.6	61.0	49.1	78.5
1930..	134.4	140.3	147.2	154.3	144.8	129.2	128.3	125.3	125.5	106.4	98.0	92.1	127.0
1929..	173.9	173.7	177.0	174.7	174.0	172.5	183.1	190.0	195.2	175.6	180.8	182.7	171.1
1928..	124.1	121.7	127.4	135.0	139.9	133.9	133.6	137.9	146.5	159.2	161.6	161.1	159.4
1927..	95.4	97.1	98.1	99.4	102.1	103.4	105.4	110.4	116.4	113.3	118.6	123.4	107.0
1926..	92.3	92.5	87.0	83.7	83.6	87.8	80.3	88.1	84.1	91.7	93.0	96.2	90.3
1925..	74.7	75.8	78.1	72.7	75.0	76.9	79.6	80.4	82.9	86.5	90.0	90.7	79.9
1924..	62.9	62.3	61.3	59.9	58.4	59.3	63.2	64.5	61.9	63.9	66.4	70.4	63.9
1923..	63.9	66.4	66.0	65.1	61.0	57.5	55.3	55.8	56.2	55.1	57.4	60.7	60.1
1922..	50.2	51.2	53.1	57.0	59.9	59.4	59.1	60.5	62.7	61.0	61.3	61.8	53.4
1921..	49.2	48.8	47.5	48.1	49.6	44.4	43.4	42.0	43.4	44.7	48.1	50.0	49.7
1920..	69.5	62.1	67.2	67.4	62.3	61.0	60.3	55.7	57.3	55.6	51.9	46.7	50.8
1919..	54.5	54.7	57.1	60.4	65.3	68.4	72.2	67.7	69.4	74.5	72.3	70.5	65.6
1918..	49.3	50.2	49.8	48.9	50.8	50.9	51.7	52.0	51.2	53.2	54.3	53.7	54.1
1917..	62.5	58.0	61.7	60.3	60.3	62.1	60.9	57.7	54.3	50.9	45.9	44.6	58.6
1916..	58.8	58.5	58.4	57.4	58.4	58.4	57.1	58.0	62.4	65.9	70.0	65.0	66.8
1915..	38.1	37.4	39.4	44.6	43.5	45.7	47.2	50.5	53.5	57.4	53.8	59.5	48.0
1914..	42.2	43.5	43.2	41.7	42.0	41.5	39.3	N.Y.S.E. Closed					37.5
1913..	44.6	44.2	43.8	43.3	42.0	38.9	39.7	42.0	42.8	40.8	39.5	39.8	41.9
1912..	43.2	42.3	44.5	47.4	47.5	48.5	48.7	50.0	50.9	51.2	50.0	47.2	47.6
1911..	45.1	46.5	45.0	45.2	46.4	47.2	46.9	44.1	40.4	39.5	41.6	43.0	44.3
1910..	51.6	48.1	49.9	49.2	47.0	44.2	41.6	43.1	43.3	46.0	46.7	44.4	48.3
1909..	49.5	38.5	38.5	41.3	44.1	45.8	46.9	46.9	46.7	51.1	52.3	52.8	48.9
1908..	23.3	27.4	29.7	31.8	32.2	32.2	35.4	36.3	36.7	37.4	40.7	40.7	34.4
1907..	45.0	41.6	39.5	38.9	37.2	36.2	37.9	34.0	32.2	27.1	25.3	26.5	28.3
1906..	45.9	45.5	43.5	43.5	41.9	41.9	40.5	44.3	46.1	46.3	46.2	45.8	44.3
1905..	34.7	36.4	37.7	37.9	35.5	35.4	36.9	38.4	38.0	39.3	40.0	43.3	37.8
1904..	25.0	24.4	24.2	24.6	23.8	22.9	25.1	26.0	27.6	26.1	23.5	24.1	26.0
1903..	35.1	36.1	35.0	32.5	23.4	30.3	27.7	26.5	25.2	23.5	22.9	24.2	29.4
1902..	38.9	36.4	36.4	37.4	36.9	35.9	36.1	37.9	37.1	36.0	34.3	23.9	38.0
1901..	34.5	35.0	36.3	36.3	36.0	40.9	36.3	35.1	37.3	35.8	35.7	34.5	38.6
1900..	32.3	32.0	32.3	32.2	29.7	28.2	28.8	29.5	28.8	30.0	28.2	34.5	31.0
1899..	31.9	32.3	34.3	35.4	33.4	32.2	33.1	34.9	35.0	35.2	36.7	31.6	38.8
1898..	22.9	23.1	22.1	22.1	24.2	25.4	26.0	27.0	26.7	26.9	27.5	26.8	25.2
1897..	20.5	20.1	20.1	19.5	19.4	20.4	21.6	22.2	24.0	22.9	21.8	22.5	21.9
1896..	20.7	21.6	21.6	22.0	21.6	20.7	18.8	17.5	19.0	19.5	21.5	20.4	20.4
1895..	21.0	20.6	21.2	22.8	24.6	25.0	24.7	24.5	24.8	22.9	22.5	20.7	28.0
1894..	21.2	21.6	22.6	23.3	22.6	22.5	21.8	22.9	22.6	21.5	21.5	21.1	22.1
1893..	21.3	20.6	20.0	20.4	22.8	22.4	19.2	19.2	21.5	22.1	22.9	21.7	24.5
1892..	27.7	27.6	27.9	28.0	28.4	29.0	29.2	30.3	30.1	31.3	31.6	31.2	29.4
1891..	25.5	26.5	26.5	27.1	26.6	26.1	25.5	25.7	26.0	26.6	26.5	27.4	26.4
1890..	27.6	26.9	26.9	27.2	28.9	29.1	29.1	28.9	28.6	27.9	26.0	23.8	27.8
1889..	27.6	29.2	29.5	29.9	30.8	32.5	32.2	31.3	30.6	29.2	27.6	27.3	26.8
1888..	23.5	23.5	22.9	23.0	23.4	23.9	24.0	25.3	26.0	26.7	27.3	27.1	24.8
1887..	23.3	22.9	24.2	24.8	25.1	24.7	24.0	23.4	23.1	22.0	22.3	22.3	22.9
1886..	22.2	22.8	22.4	22.3	21.9	22.6	22.8	22.8	22.9	22.4	22.9	22.8	22.8
1885..	18.5	19.1	19.2	19.4	19.5	19.5	19.7	20.5	20.8	21.5	22.2	22.0	20.2
1884..	19.4	19.9	20.0	19.8	18.2	17.7	18.9	19.6	18.9	18.9	18.5	18.5	18.9
1883..	21.0	20.7	20.4	20.9	21.0	21.3	21.3	21.0	20.7	20.2	20.3	19.8	20.7
1882..	22.9	22.4	22.2	22.3	22.0	21.7	22.3	22.6	22.7	22.2	21.4	21.2	22.2
1881..	21.0	21.4	21.6	21.9	22.9	22.6	22.9	22.9	22.8	23.0	22.2	22.8	22.5
1880..	20.3	19.9	20.1	19.2	18.6	18.6	18.8	19.2	19.1	18.7	19.2	19.6	19.3
1879..	18.2	18.4	18.4	18.6	18.9	17.0	17.0	16.8	17.2	19.4	20.1	19.7	17.5
1878..	16.2	16.1	16.2	16.1	16.6	16.5	16.5	16.4	16.8	16.5	16.5	16.4	16.4
1877..	19.4	18.0	18.0	17.1	16.8	14.4	14.8	15.3	15.8	16.4	15.9	16.0	16.6
1876..	21.1	22.4	21.9	21.7	21.6	21.5	20.9	20.9	19.6	19.7	19.7	19.7	20.9
1875..	21.1	21.2	21.4	21.7	21.7	20.3	20.4	20.3	20.5	20.0	20.5	20.5	20.8
1874..	22.0	22.2	22.1	22.5	21.9	22.6	22.0	21.3	21.2	21.4	22.1	22.0	22.1
1873..	22.9	22.9	22.9	22.5	22.0	22.5	22.4	22.7	21.0	19.6	18.7	20.7	21.8
1872..	20.1	20.8	21.8	22.5	22.8	22.7	22.1	21.8	21.0	21.8	22.3	22.7	21.9
1871..	18.0	18.2	16.9	18.0	19.2	19.2	19.1	19.2	19.8	19.1	19.2	19.5	18.4

The corresponding values for 1952, insofar as they are available as we go to press, are as follows: (Subsequent values will be printed later.)

Jan., 204.3; Feb., 199.2; Mar., 201.4; April, 199.4; May, 199.2; June, 203.9; July, 209.7; Aug., 207.8; Sept., 204.2; Oct., 198.8; Nov., 203.8

Stock Prices 1854-1952

IN an article about one of the cycles in industrial common stock prices which I am preparing for you, I find it necessary to go back of 1871 in the hope of clearing up a moot point. Standard and Poor's Corporation Index of Industrial Common Stock Prices, printed for you on the page preceeding, does not go back further than 1871. There are, however, other indexes that do go back further as discussed on page 143 of my report for April 1951. To extend the Standard and Poor's Corporation Industrial Common Stock Price Index, in order to clear up the point that is bothering me, I have chosen the Clement-Purgess Index, multiplied by a constant so that it can be spliced to the Standard and Poor's Corporation Index.

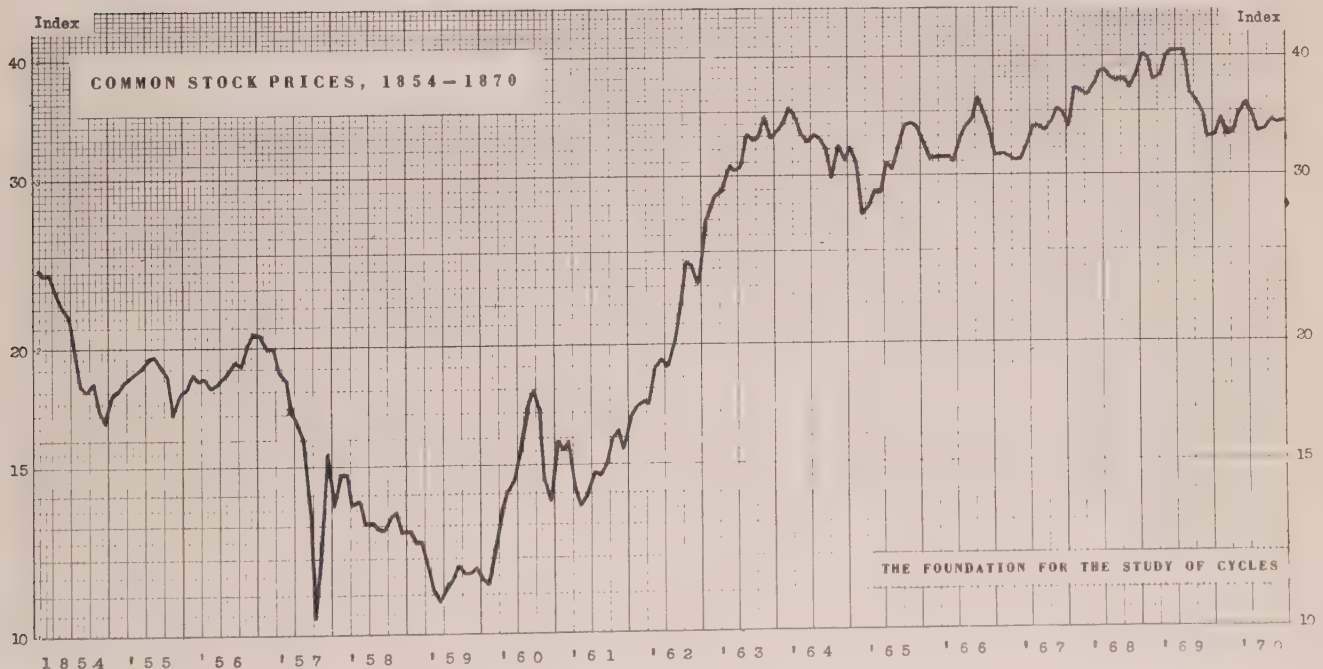
A chart of the original values of the Clement-Burgess Index from January 1854 through December 1870 is plotted below so that you can see the general configuration of the curve.

Charts of the Standard and Poor's Corporation Index of Industrial Common Stock Prices, brought up to date of publication, are shown on the two pages next following.

The overall pattern disclosed by these various charts is extremely complex, but careful study shows that the figures act as if stock market prices were influenced by regularly recurring cyclic forces, the interplay of which is partly responsible for the behavior shown. These cycles are not readily apparent. If they were, and if they continued, all stock market speculators would take advantage of them and would either become millionaires or would eliminate the cycles by the force of their counteracting purchases and sales.

Regardless of the cycles, however, it is apparent we are now, as this article is written (December 1952), higher above trend than almost ever before, and that "what goes up must come down," as used to be said in a game played when I was a boy.

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The Clement-Burgess Index of Common Stock Prices, January 1854-December 1870. Ratio Scale. This index is composed of four to nine stocks, chiefly leading Railroads.

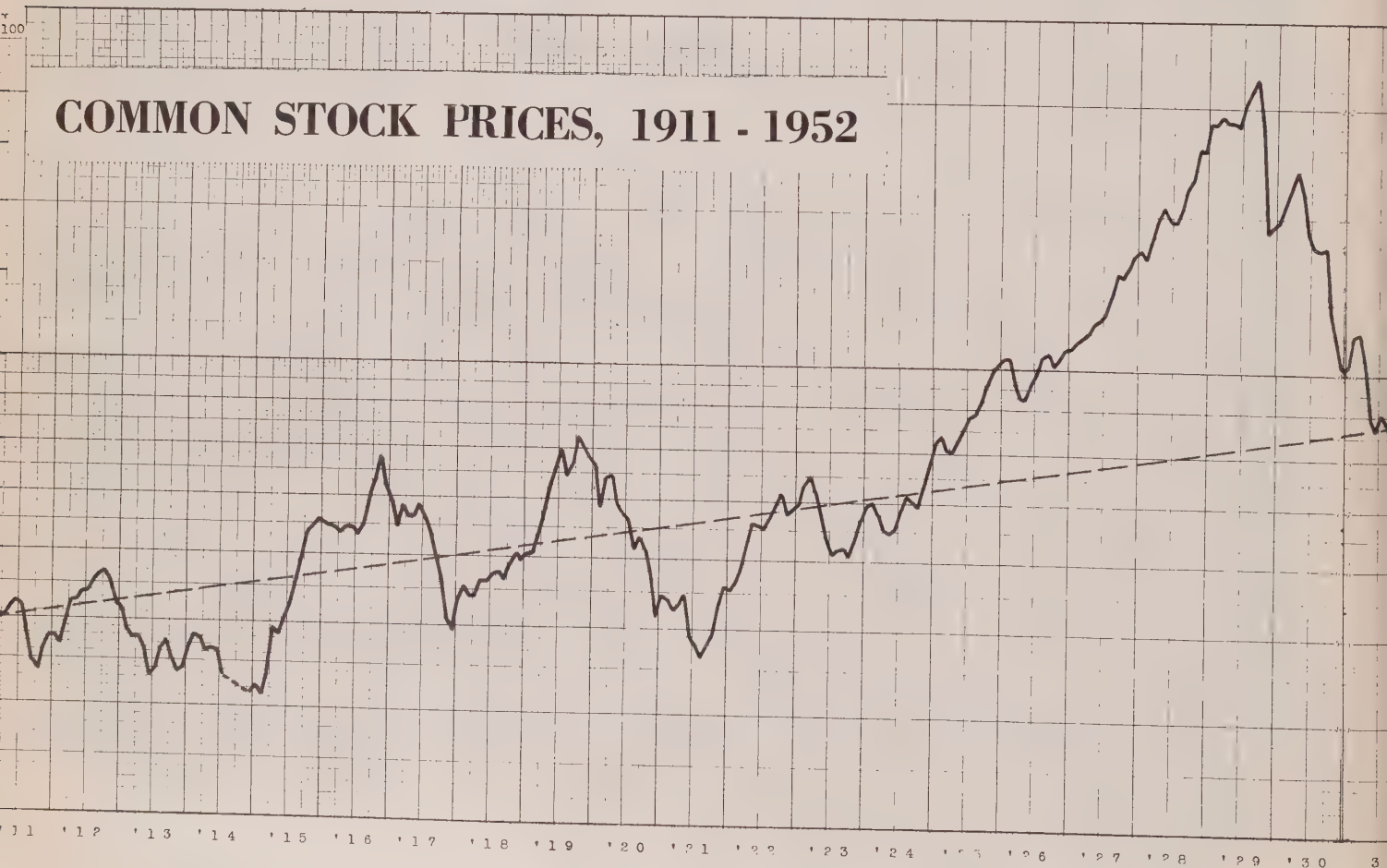
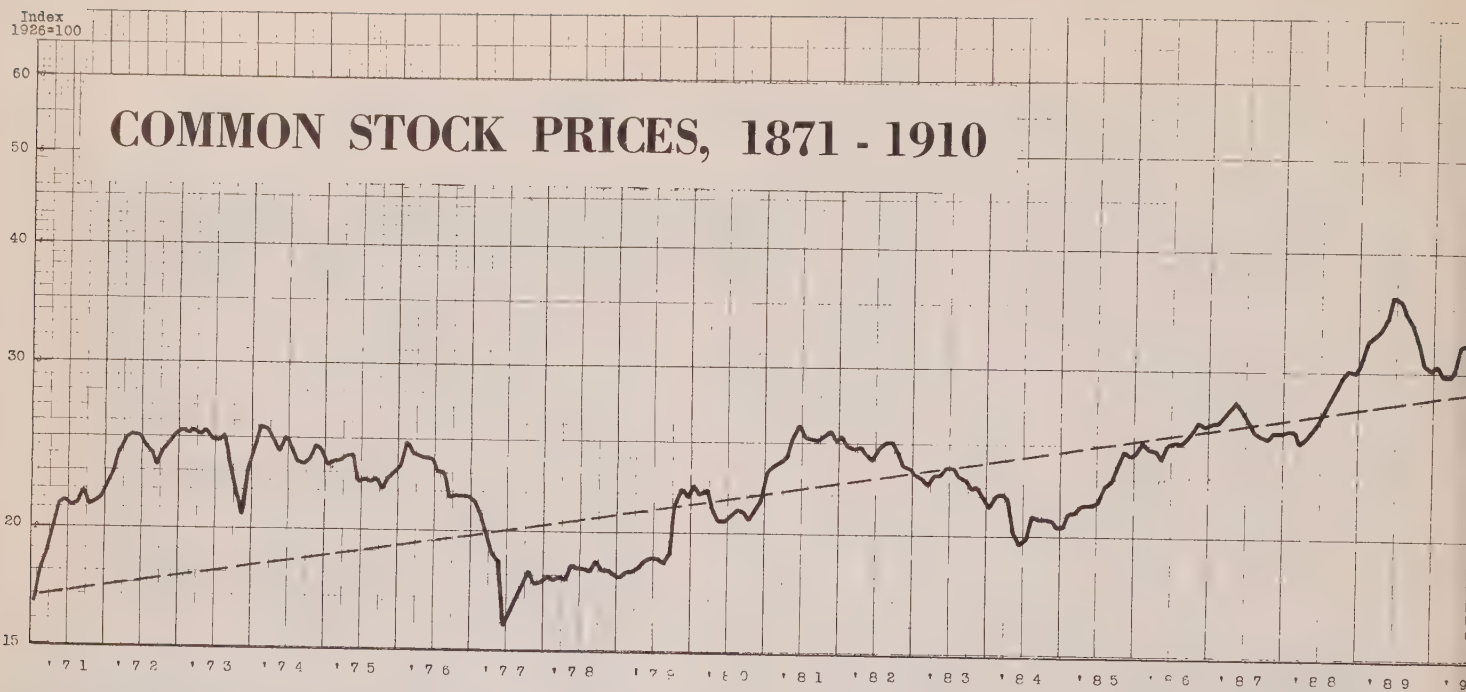
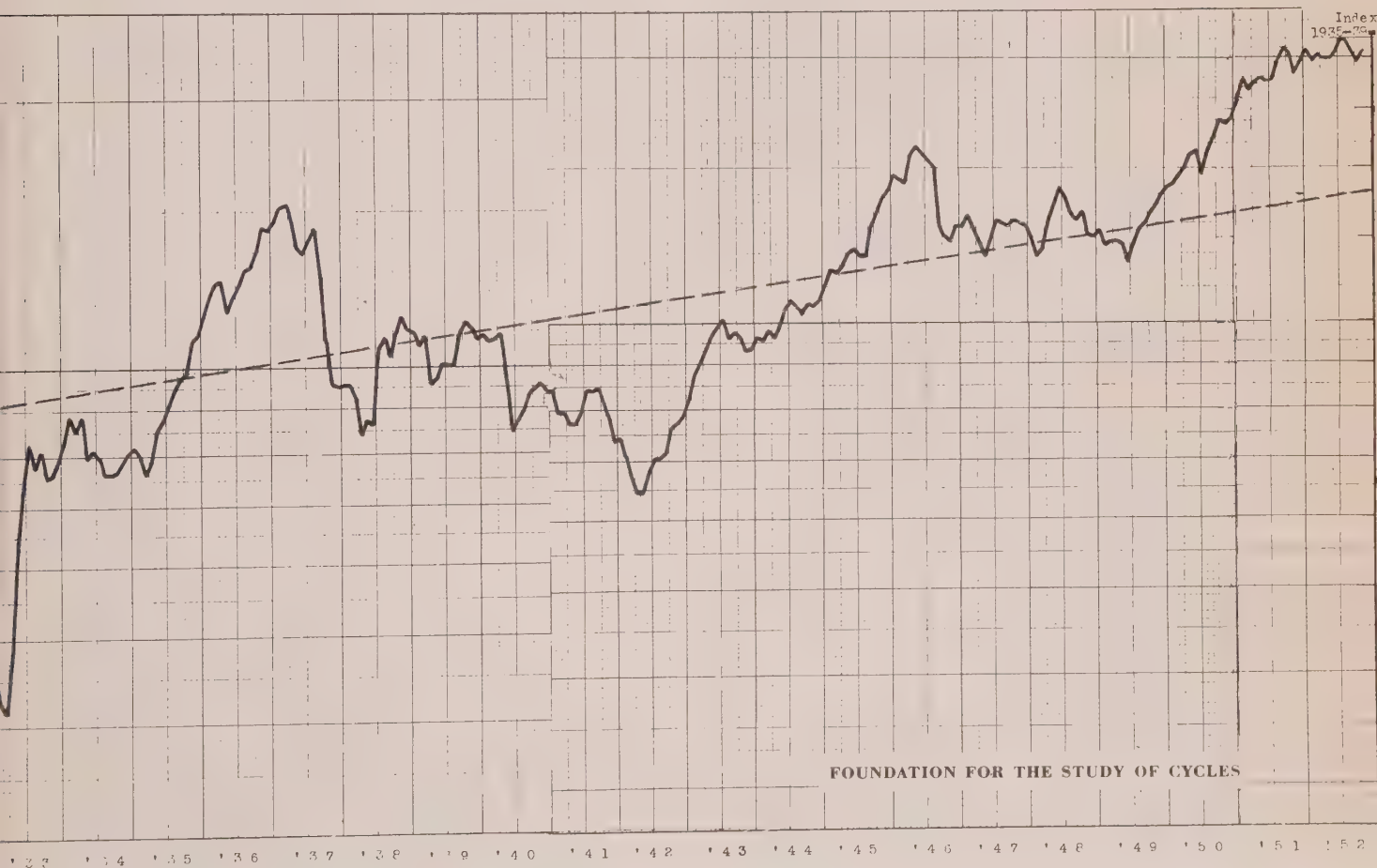
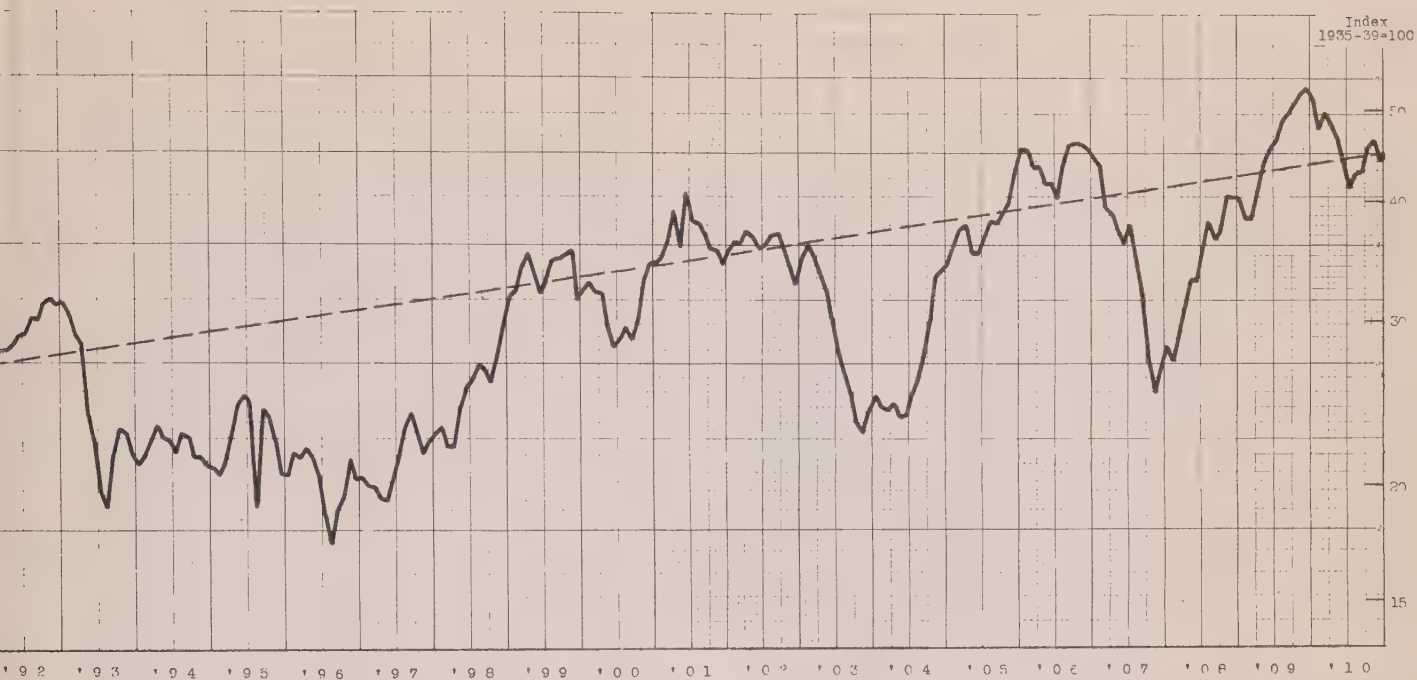


Fig. 1. Index of Industrial Common Stock

THE CHART REPRESENTS THE STANDARD AND POOR'S CORPORATION INDEX OF INDUSTRIAL COMMON STOCKS (NOW 420 STOCKS) AS EXTENDED BACKWARD TO JANUARY 1971 BY THE COWLES COMMISSION FOR RESEARCH IN ECONOMICS, TOGETHER WITH A STRAIGHT LINE TREND FITTED BY MEANS OF LEAST SQUARES



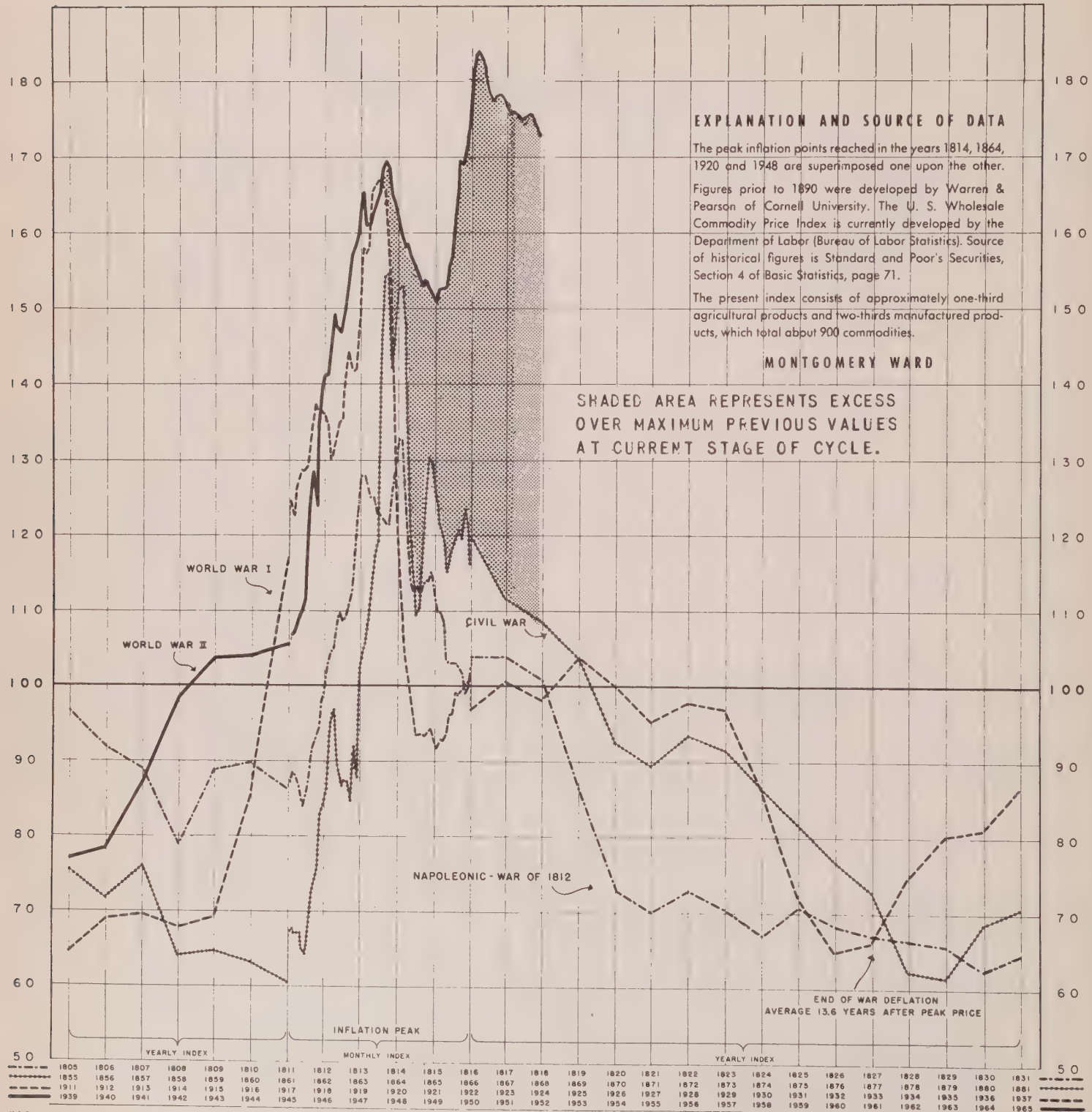
FOUNDATION FOR THE STUDY OF CYCLES

ices, 1871-1952, together with trend.

THE LOGS OF THE ANNUAL DATA. LEFT HAND SCALE REPRESENTS THE OLD
 IS OF COMPUTATION, 1928=100. RIGHT HAND SCALE REPRESENTS THE NEW
 IS, ESTABLISHED JANUARY 1931, 1935-39=100. ALL POINTS ON THE
 VE CAN BE READ FROM EITHER SCALE. RATIO SCALE.

U. S. WHOLESALE COMMODITY PRICE INDEX MAJOR WAR PERIODS

U. S. BUREAU OF LABOR STATISTICS • 1926 = 100 • ALL COMMODITY



Prices normally go up during wars and for a short time thereafter.

After previous wars prices always declined.

After World War II, however, our govern-

ment manipulated the currency to keep prices up.

Excess of prices during the past four years over maximum previous prices after war peaks is shown by the shaded area.

How it Came Out

THE 6-YEAR CYCLE

-IN AMERICAN VISCOSE
-IN ARMOUR
-IN DU PONT
-IN MONSANTO CHEMICAL
-IN MONTGOMERY WARD
-IN NATIONAL LEAD

ASIX-YEAR cycle dominates many aspects of American business activity. A full account of our research in respect to this cycle was contained in my report for December 1950, which see. In that report I showed you the extent to which this cycle had been present in the sales, shipments, or production of 25 leading corporations as well as in various natural phenomena. The purpose of this article is to examine the figures of six of the companies discussed in the December 1950 report to see how the 6-year cycle in their figures has unfolded.

Last Month's Report

In my report for last month (December 1952) I brought up to date the figures for the 6-year cycle in

- Allis Chalmers sales
- Jones & Laughlin sales
- Pittsburgh Plate Glass sales
- Sears, Roebuck sales
- Swift and Company sales
- Youngstown Sheet and Tube sales

Future Reports

In a future issue I shall report to you upon the unfolding of the 6-year cycle in

- Armco Steel sales
- Bethlehem Steel production
- Continental Oil operating income
- B. F. Goodrich sales
- Goodyear Tire and Rubber sales
- Procter and Gamble sales
- Republic Steel ingot production

- Seaboard Airline operating revenue
- Standard Oil of California operating income
- Standard Oil of N. J. operating income
- U. S. Rubber sales
- Wilson & Company sales

This Report

In this article I shall discuss the 6-year cycle in

- American Viscose shipments in pounds
- Armour sales
- du Pont sales
- Monsanto sales
- Montgomery Ward sales
- National Lead sales

Some Explanations and Definitions

When we talk about a "6-year cycle" in a series of figures we mean that the figures act as if they had been subjected to a force that was alternately positive or upward for about three years and then negative or downward for about three years. Such an alternation of upward and downward forces would, ideally, produce a succession of complete waves or cycles, each about six years long. Such a cycle is said to be **rhythmic** because it repeats with some degree of regularity--that is, with a beat. **Rhythm** comes from a Greek word meaning **measured time**.

The successive waves of a 6-year cycle will not all be six years long. Some will be longer, some will be shorter. The 6-year cycle must be thought of as a **tan-**

dency. Actual behavior is buffeted about by other cycles and by random forces.

Cycles Are Relative

Also, the upward and downward legs of a 6-year cycle must be thought of as modifications of the underlying growth trend, not necessarily as absolute upward and downward movements. The business may be growing so fast that the downward force of the 6-year cycle may merely slow down or check the rate of advance. Therefore, in many instances the 6-year cycle may not cause any decline at all in the actual figures. It is for this reason that the 6-year cycle, or any other cycle, can be seen more easily if we correct for trend.

Trend

Trend is the tendency of data in a series of figures to increase or decrease during a long period of time. How long is "long" will be discussed elsewhere.

There are various ways of measuring trend. For cycle study a trend computed by means of a moving average is often best. For studying a 6-year cycle you should use a 6-year moving average trend. This is the trend that has been used in this study. It will be explained more fully later in this report.

Charts of Original Data Desirable

In the report of December 1950 I showed you sales, shipments, or production of the various companies **after** adjustment for trend. Because of lack of space I did not show you the actual figures **including** trend.

Many people like to see a chart of the original figures before any manipulations have been made. For example, a recent letter from Anthony Procker of Lombard, Illinois reads:

Mr. Procker's Letter

"I have a suggestion to make about your articles and charts in the CYCLES publication. More than once, after reading an article, and studying the accompanying charts, I have wondered, 'Now, what was the actual course of events, before these charts and figures were 'doctored' with moving averages and correction for trend, etc.?' For instance, in the current issue

of CYCLES, you have an interesting article showing a pronounced cycle in the sales of a certain company. However, you state that the charts given with the article were smoothed by a certain moving average and by at least one other change. (I should have to consult the article again, for the exact details. I do not have it at hand for this writing.)

"My suggestion is this: Side by side with the chart of this company's sales, as smoothed by the moving average, etc., I should have liked to see another chart of the actual sales for the same period, with no alterations whatever. By this kind of comparison, I believe we should reach a better understanding of all the important facts, and eventually learn to make some practical application of this cycle study."

Charts of Original Data Being Shown

I fully agree with Mr. Procker. Charts of the original unmanipulated data should always be shown.

In bringing the 6-year cycle work up to date I am therefore showing you charts of both the original figures (Figs. 1) and charts of the figures adjusted for trend (Figs. 2), in spite of the large amount of space required.

Figures for Three More Years Now Available

In the earlier work, figures for 1948 were the latest available. We now have figures for 1949, 1950, and 1951 also. These additional values are shown on all the Figs. 1 following, by means of a heavy solid line. The line is heavy to show that these figures have come into being since the earlier report was written.

As a 6-year moving average trend cannot be computed for the first three or for the last three years of a series of figures, the trend in the earlier work stopped in 1945. All the curves in Figs. 2, which show values adjusted for trend, stopped in that year also, necessarily.

With figures now available for 1949, 1950, and 1951 we can compute the moving average values for 1946, 1947, and 1948. This has been done. This computation enables us to calculate values for figures adjusted for trend (Figs. 2) for these three years also. These values, like the values of the original data, have been

plotted by means of a bold line so that you can see how the curves have unfolded through 1948.

Charts Up to Date

But you want charts that are up to date. No one can compute a 6-year moving average closer to the end of the series of figures than three years, but we can **guess** what this moving average is perhaps going to be. In my earlier work I did not venture to make these guesses, but at this time I am doing so. These guesses give us provisional trend values for 1949, 1950, and 1951, plotted in all the Figs. 1 by means of a dotted line, and provisional values for the first three years of trend too. With provisional trend values computed we can, of course, make provisional adjustment for trend. This has been done too, and the results shown in all the Figs. 2 by means of a heavy broken line for 1949, 1950, and 1951, and by means of a light broken line for the first three years of each series of figures.

We are now in shape to see the extent to which the 6-year cycle in each series of figures has or has not come true, but before doing so it might be helpful to insert a technical section to explain in full the arithmetic involved in the computations and manipulations which have been made. If you are not interested in techniques this technical section may be skipped.

Techniques and Arithmetic

Let us work out the arithmetic for the first few figures for the American Viscose Corporation charts on page 28.

Shipments, the solid line in Fig. 1, come from Column A of the table below. The trend, shown by a dashed line in Fig. 1, comes from Column E. The three values at each end of the trend shown by a dotted line are pure guesses. The deviations from trend shown by the solid line in Fig. 2 come from Column F.

You will find the moving average explained further in the Glossary on page 35.

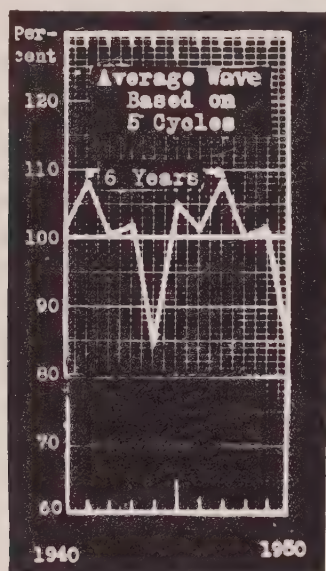
YEAR	SALES IN MILLIONS OF POUNDS	SIX-YEAR MOVING TOTAL OF THE SALES POSTED BETWEEN THE YEARS	SIX-YEAR MOVING AVERAGE OF THE SALES POSTED BETWEEN THE YEARS	TWO-YEAR MOVING TOTAL OF THE SIX-YEAR MOVING AVERAGE TRULY CENTERED	TWO-YEAR MOVING AVERAGE OF THE SIX-YEAR MOVING AVERAGE TRULY CENTERED	PERCENTAGES THAT DATA ARE OF THEIR SIX-YEAR MOVING AVERAGE CENTERED (COL. A $\div$ COL. E $\times$ 100)
1912	1					
1913	2					
1914	2	21	3.5	7.8	3.9	102.6
1915	4	26	4.3	9.6	4.8	125.0
1916	6	32	5.3	11.5	5.8	103.4
1917	6	37	6.2	14.2	7.1	84.5
1918	6	48	8.0	18.2	9.1	87.9
1919	8	61	10.2	23.0	11.5	60.9
1920	7	77	12.8	29.6	14.8	101.4
1921	15	101	16.8			
1922	19					
1923	22					
1924	30					

The 6-Year Cycle in American Viscose Shipments

Figures for the shipments in pounds of the American Viscose Corporation are available from 1912 through 1951. They and their trend are plotted in Fig. 1 on page 28.

The deviations from trend are plotted in Fig. 2 on the same page. A 6-year cycle in these figures from the beginning is clearly evident. It is diagrammed by a broken zigzag line in Fig. 2.

An average wave based on five cycles is shown below:



This average wave shows a variation

from about 85% of trend at trough to about 108% of trend at crest.

Troughs come ideally in 1950 and six years forward and backward from that date. Crests come ideally in 1953 and six years forward and backward.

The average cycle shows a peculiar zigzag shape which indicates the probable concurrent presence of a recurring cycle about two years in length with crests in the odd years.

Of the six crests two came exactly at ideal timing, three came within one year of perfect timing, and one was distorted by two years.

It is too soon to know whether or not the trough in 1949 was the bottom of the present cycle, come a year early, but of the remaining six troughs, four came exactly on time, one was one year late and one was two years early.

The behavior of this cycle in these figures since discovery, as indicated by the heavy line in Fig. 2, conforms to ideal behavior with no more than the variations usual in the past. This conformity indicates the probable continuing existence of this cycle.

The year 1953 is the ideal time for the crest of the 6-year cycle in the shipments of this company. Therefore, if typical behavior continues, for 1954, 1955, and 1956 we may expect a decline in shipments relative to trend, subject however to variation as in the past.

The 6-Year Cycle in Armour Sales

Figures for the dollar sales of Armour and Company are available from 1901 through 1951. They and their trend are plotted in Fig. 1 on page 29.

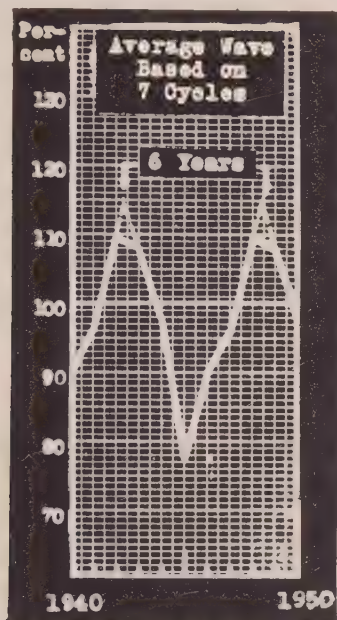
The deviations from trend are plotted in Fig. 2 on the same page. In spite of a bad distortion in 1909 and 1910 a 6-year cycle in these figures is clearly evident.

It is diagrammed by a broken zigzag line in Fig. 2. Eight consecutive waves of about six years each cannot easily be the result of chance. The possibility of the continuation of this cycle in these figures cannot be ignored.

Fig. 2 was published on page 282 of the report for October 1952 but is reprinted

here so that you can compare it with Fig. 1 which was not published at that time.

An average wave based on seven cycles is shown below:



This average wave shows a variation from about 78% of trend at trough to about 115% of trend at crest.

Troughs come ideally in 1951 and six

The 6-Year Cycle in du Pont Sales

Figures for the sales to customers of E. I. du Pont de Nemours & Company are available from 1925 through 1951. They and their trend are plotted in Fig. 1 on page 30.

The deviations from trend are plotted in Fig. 2 on the same page. Three "6-year" waves in these figures are clearly evident. An ideal 6-year pattern is diagrammed by a broken zigzag line in Fig. 2.

An average wave based on three cycles is shown in the chart to the right.

This average wave shows a variation of from about 84% of trend at trough to about 117% of trend at crest.

Troughs come ideally in 1950 and six years forward and backward from that date. Crests come ideally in 1953 and six years forward and backward.

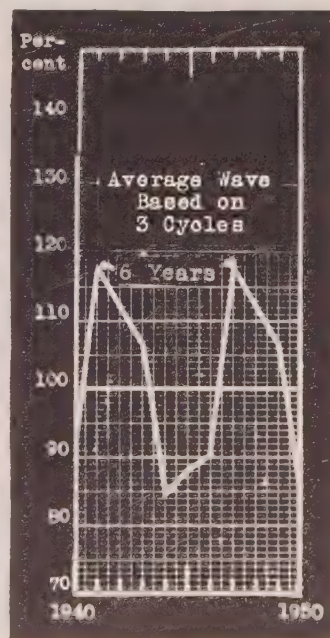
The rather peculiar shape of the actual cycle suggests the possible concurrent

years forward and backward from that date. Crests come ideally at the end of 1954 and forward and backward from that time.

Of the nine crests, six were within one-half year of perfect timing and three were within one and one-half years of perfect timing. Without figures for 1952 it is too early to say for certain that the low of 1950 was the low of the present cycle come one year early, but of the remaining eight troughs, two came exactly on time and six were within a year of perfect timing. This, in itself, suggests that the low of 1950 was the low of this cycle but it does not prove it.

The behavior of this cycle in these figures since discovery, as indicated by the heavy line in Fig. 2, conforms to ideal behavior with no more than the usual variations of the past. It indicates the continuing existence of this cycle.

It is clear that Armour and Company dollar sales are in a part of the 6-year cycle that has typically been strong. If this cycle continues we may expect increased strength relative to trend until 1954-1955. After that time we can be prepared for the possibility of two and one-half years of relative decline.



presence of a cycle about two years in length with crests in the odd years.

Of the four crests of which we have a record, two came exactly on time and two came a year late.

Of the five troughs, two came exactly on time; one, the trough due in 1950, came one year early; the trough due in 1944 came two years late. Without knowing the exact figures for trend it would be unwise to try to estimate the exact timing of the trough which came somewhere between 1925 and 1927.

The behavior of this cycle in these figures since discovery is poor. In fact,

in normal times in a series of figures as short as this (and hence with only three cycles in the past to go on) one would be justified in assuming that the 6-year cycle from 1925 through 1945 might have been present merely as a result of random forces. However, 1950 and 1951 were years of war and preparation for war. It seems likely that the distortions from the 6-year pattern in these years may have been due to war influences.

If, however, the 6-year cycle in these figures reasserts itself we can expect a decline of sales (relative to trend) from 1953 to 1956.

The 6-Year Cycle in Monsanto Sales

Figures for the dollar sales of Monsanto Chemical Company are available from 1927 through 1951. They and their trend are plotted in Fig. 1 on page 31.

The deviations from trend are plotted in Fig. 2 on the same page. A 6-year cycle in these figures is clearly evident. It is diagrammed by a broken zigzag line in Fig. 2 on the same page.

An average wave based on two cycles is shown below:

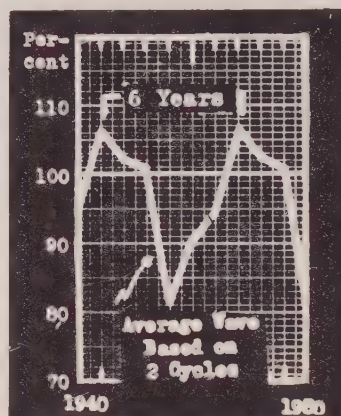
This average wave shows a variation from about 81% of trend at trough to about 106% of trend at crest.

Troughs come ideally in 1950 and six years forward and backward from that date. Crests come ideally in 1953 and six years forward and backward.

Of the four crests, three came exactly on time and one was one year late.

Of the four troughs, two came exactly on time, one was two years late, and one (1948) was one year early.

The behavior of this cycle in these



figures since discovery, as indicated by the heavy line in Fig. 2, conforms to ideal behavior with no more than the usual variations of the past. It indicates the continuing dominance of this cycle.

The unusual upward strength for 1950 and 1951 is of course due to the war, but may have been exaggerated in Fig. 2 by too conservative a determination of the trend.

The 6-Year Cycle in Montgomery Ward Sales

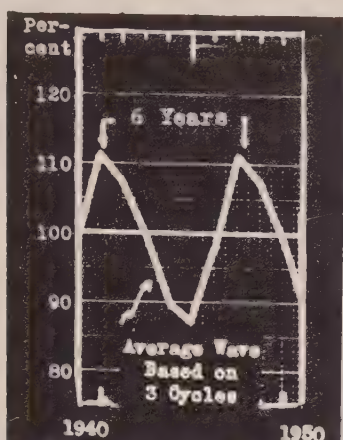
Figures for the net dollar sales of Montgomery Ward & Company are available from 1921 through 1951. They and their trend are plotted in Fig. 1 on page 32.

The deviations from trend are plotted in Fig. 2 on the same page. A 6-year cycle in these figures from the beginning is

clearly evident and is diagrammed by a broken zigzag line in Fig. 2.

An average wave based on three cycles is shown on the next page.

This average wave shows a variation of from about 87½% of trend at trough to about 111½% of trend at crest.



Troughs come ideally in 1951 and six years forward and backward from that date. Crests come ideally in 1953 and six years forward and backward. Note that normal

behavior is for four years of decline and two years of rise.

Of the five crests, three came exactly on time and two were each two years late.

Of the six troughs, we cannot be sure of the timing of the first and last until we have more figures, but of the four remaining, two came exactly on time and two were one year early.

The way in which this cycle in these figures has unfolded since 1945 is remarkable.

I wonder if Montgomery Ward & Company took this cycle into account in planning for the last four years? I hope so.

If the 6-year cycle in these figures continues for 1954, 1955, 1956, and 1957, we may expect a decline in sales relative to trend for these years.

The 6-Year Cycle in National Lead Company Sales

Figures for the net sales of the National Lead Company are available from 1930 through 1951. They and their trend are plotted in Fig. 1 on page 33.

The deviations from trend are plotted in Fig. 2 on the same page. A 6-year cycle in these figures from the beginning is clearly evident and is diagrammed by a broken zigzag line in Fig. 2.

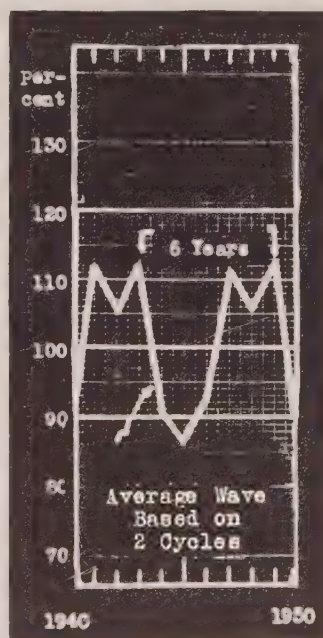
An average wave based on two cycles is shown in the next column.

This average wave shows a variation from about 86% of trend at trough to about 112% of trend at crest.

Troughs come ideally in 1951 and six years forward and backward from that date. Crests come ideally in 1954 and six years forward and backward.

Of the four crests, the one in 1948 came exactly on time as forecast, two others came within one year of perfect timing, and the actual date of the crest due in 1930 cannot be determined from the available figures. If we assume that 1940 was the trough of the present cycle, three of the lows came one year one way or the other from perfect timing and one (the one for 1940) came two years before perfect timing.

The behavior of this cycle in these figures since discovery as indicated by the heavy line in Fig. 2 conforms to ideal behavior with no more than the usual



variations of the past and indicates the probable continuing existence of this cycle.

The sales of the company for 1953 and 1954 should, if the 6-year cycle in these figures continues to dominate, show an increase relative to trend, but of the two years strength for 1954 is of course less certain.

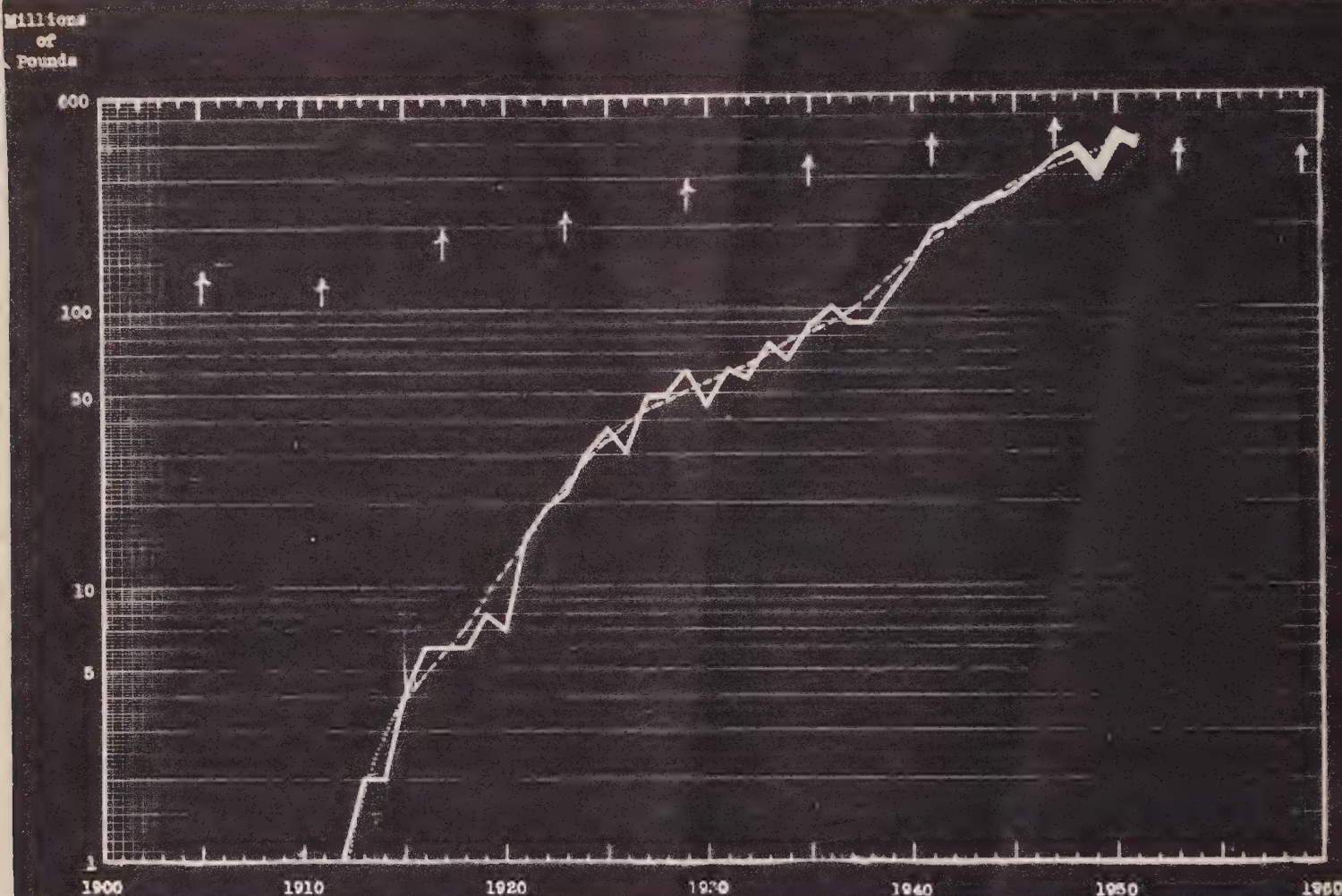


FIG. 1. AMERICAN VISCOSE CORPORATION, SHIPMENTS IN POUNDS, 1912-1951. TOGETHER WITH A SIX-YEAR MOVING AVERAGE TREND (FIRST AND LAST THREE VALUES ESTIMATED). ARROWS INDICATE TIME OF IDEAL HIGH OF SIX-YEAR CYCLE. RATIO SCALE.

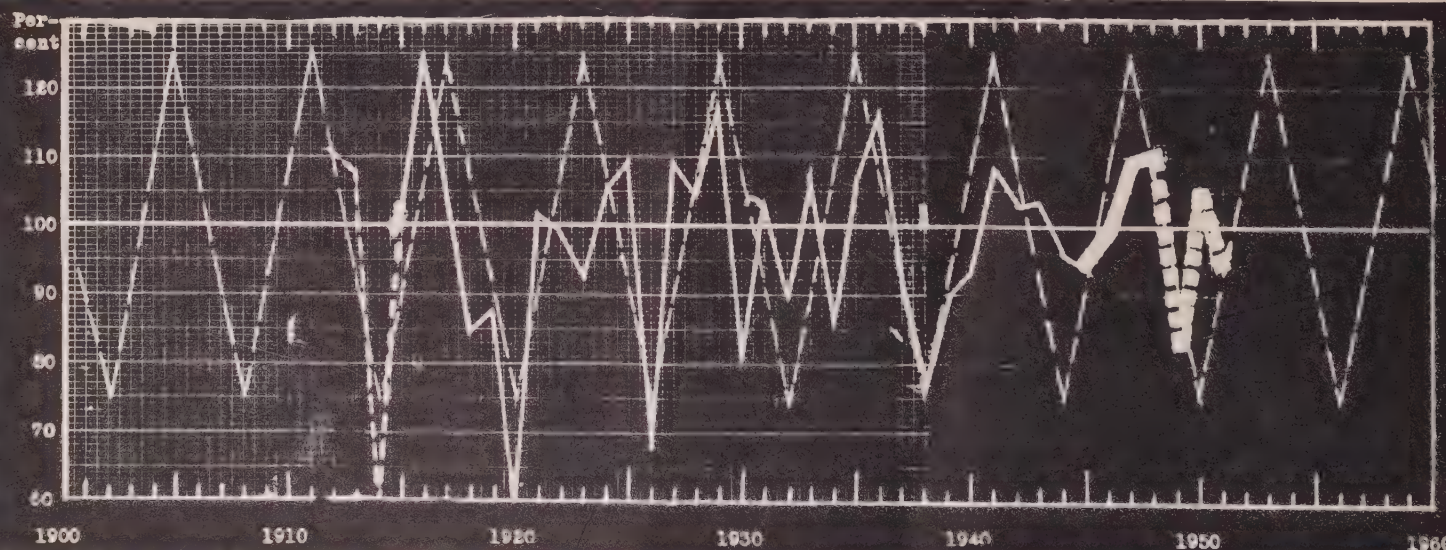


FIG. 2 THE SIX-YEAR CYCLE IN AMERICAN VISCOSE CORPORATION SHIPMENTS IN POUNDS. DEVIATIONS OF THE ACTUAL SALES FROM THEIR SIX-YEAR MOVING AVERAGE. BOLD LINE SHOWS HOW THE FORECAST HAS WORKED OUT.

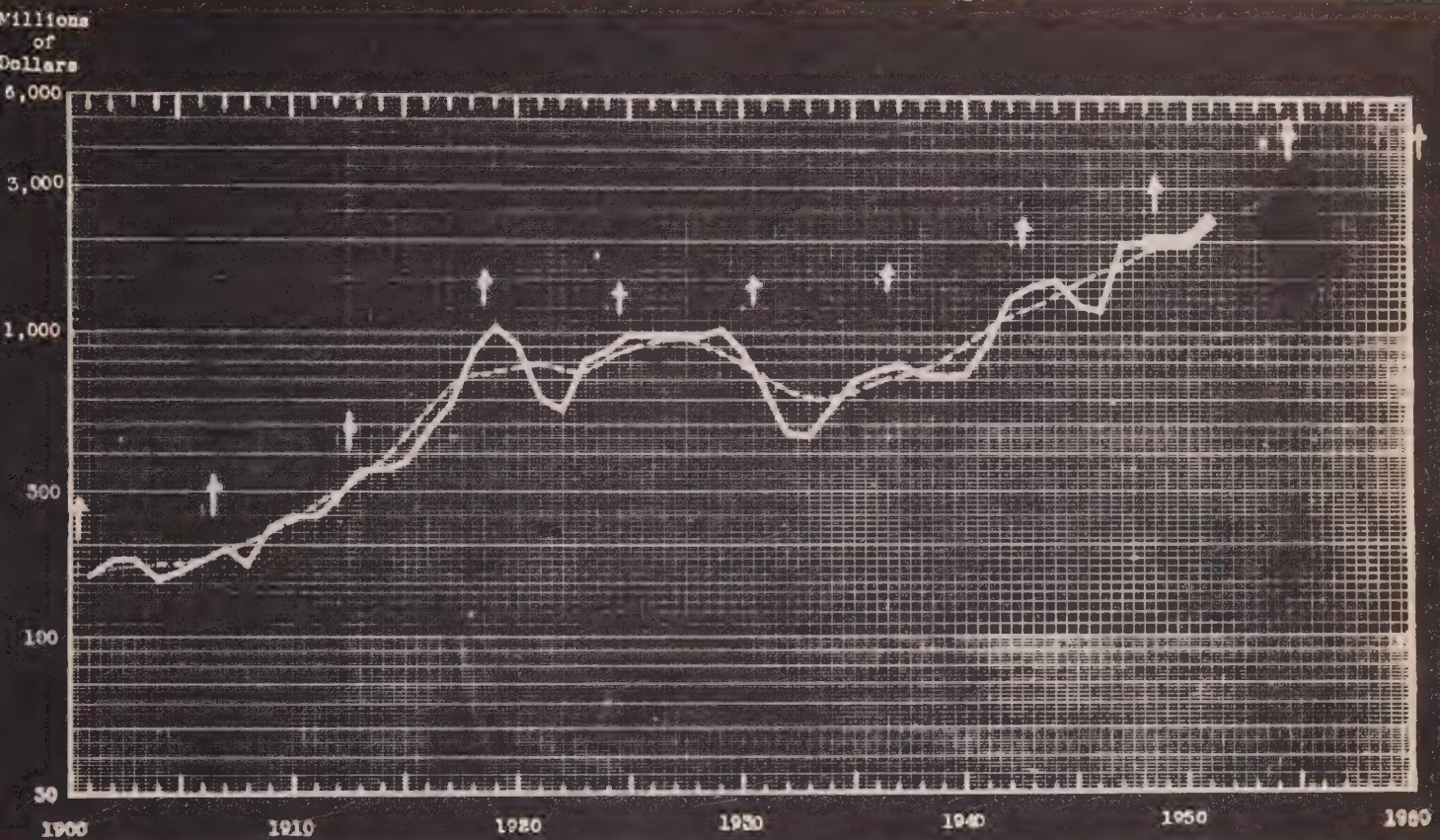


FIG. 1. ARMOUR AND COMPANY TOTAL DOLLAR SALES, 1901—1951, TOGETHER WITH A SIX-YEAR MOVING AVERAGE TREND (FIRST AND LAST THREE VALUES ESTIMATED). ARROWS INDICATE TIME OF IDEAL HIGH OF SIX-YEAR CYCLE. RATIO SCALE.

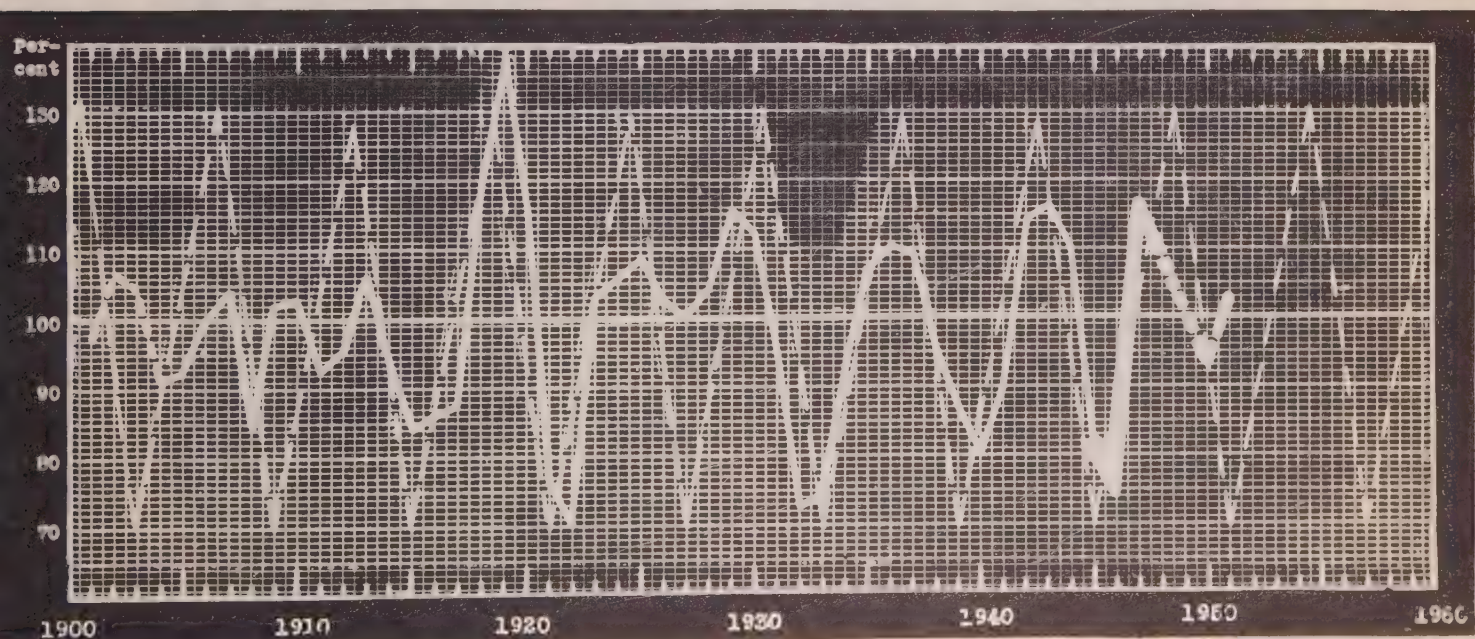


FIG. 2. THE SIX-YEAR CYCLE IN ARMOUR AND COMPANY TOTAL DOLLAR SALES. DEVIATIONS OF THE ACTUAL SALES FROM THEIR SIX-YEAR MOVING AVERAGE. BOLD LINE SHOWS HOW THE FORECAST HAS WORKED OUT.

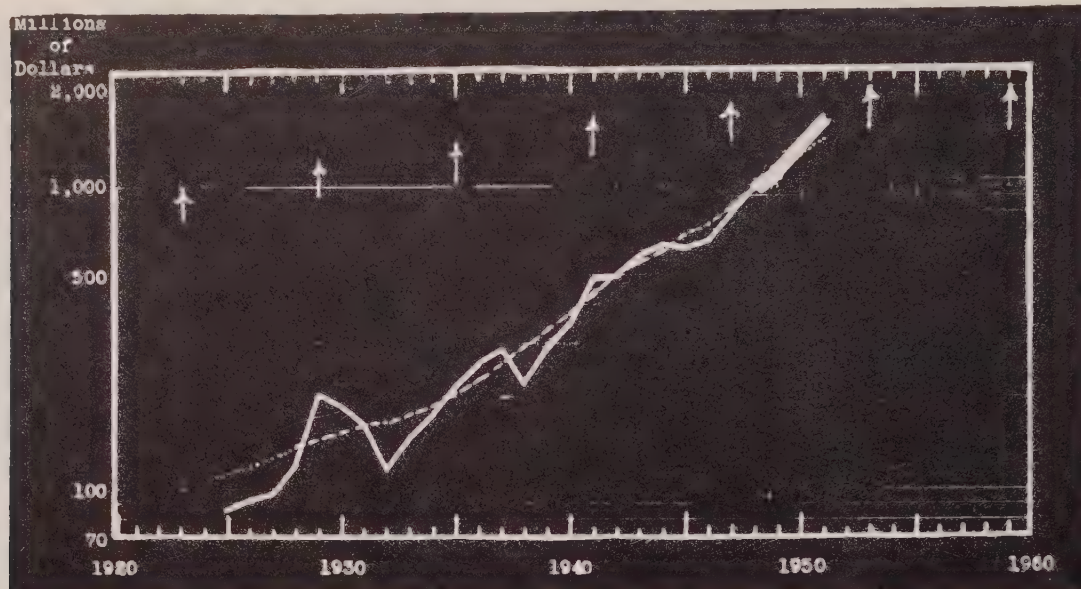


FIG. 1. E. I. DU PONT DE NEMOURS AND COMPANY DOLLAR SALES TO CUSTOMERS, 1925-1951, TOGETHER WITH A SIX-YEAR MOVING AVERAGE TREND (FIRST AND LAST THREE VALUES ESTIMATED). ARROWS INDICATE TIME OF IDEAL HIGH OF SIX-YEAR CYCLE. RATIO SCALE.

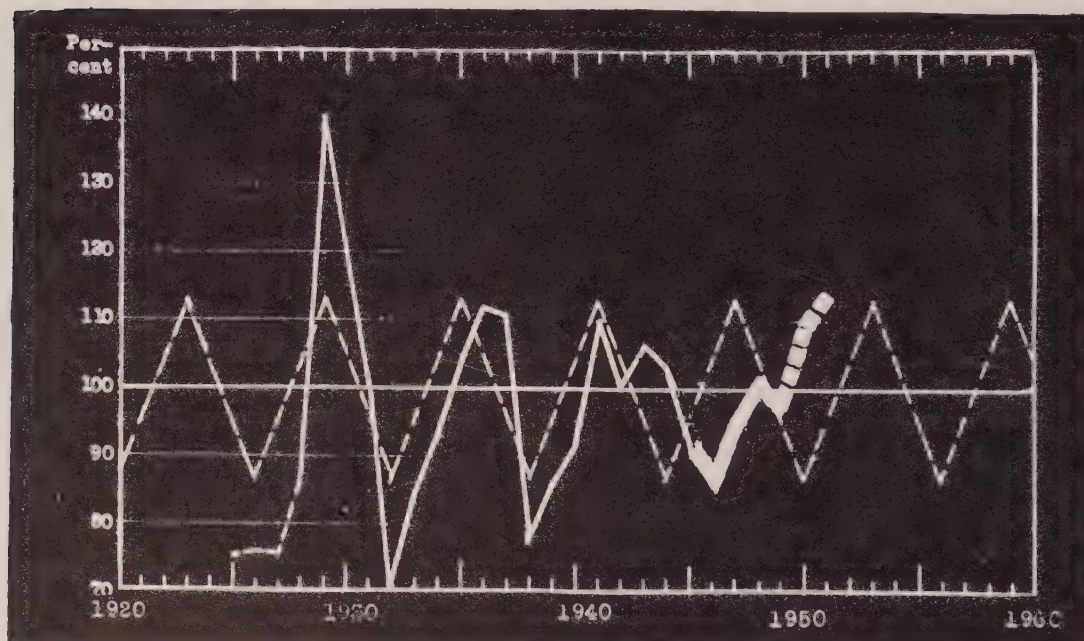


FIG. 2. THE SIX-YEAR CYCLE IN DU PONT DOLLAR SALES TO CUSTOMERS. DEVIATIONS OF THE ACTUAL SALES FROM THEIR SIX-YEAR MOVING AVERAGE. BOLD LINE SHOWS HOW THE FORECAST HAS WORKED OUT.

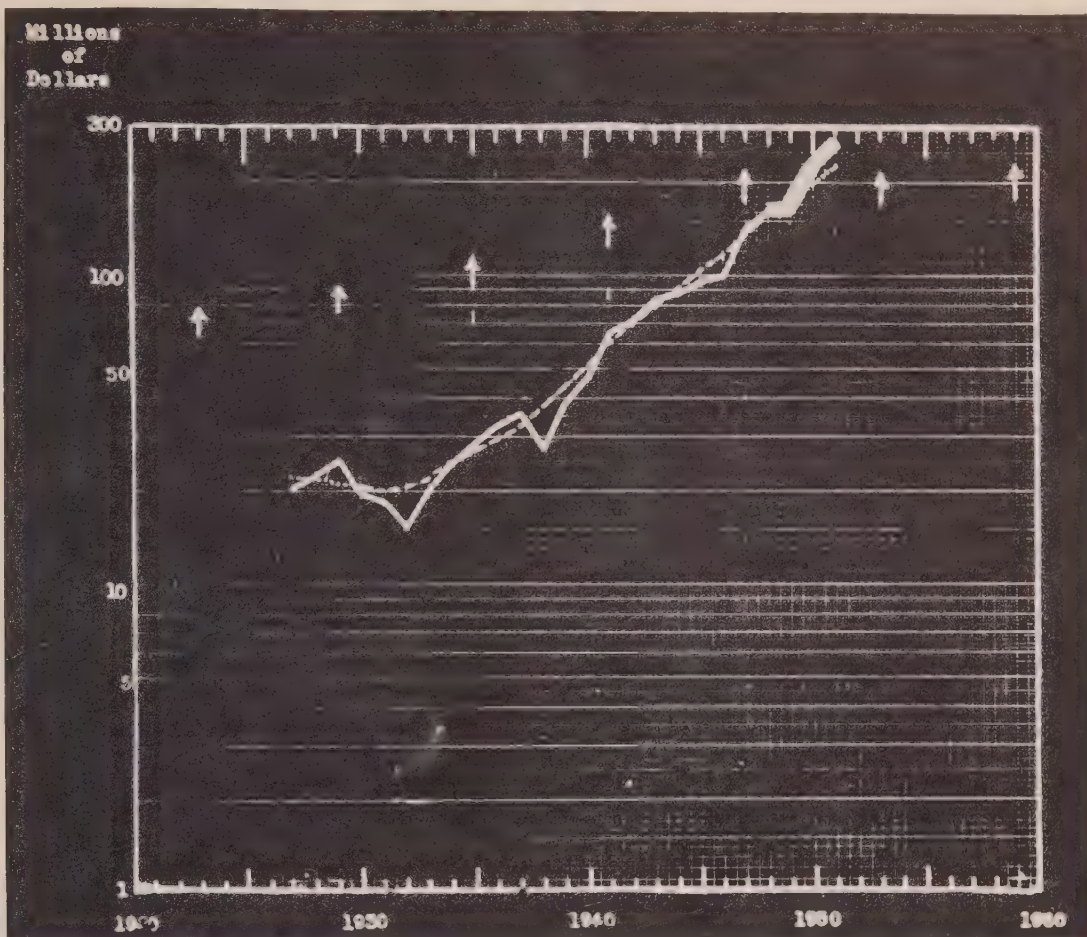


FIG. 1. MONSANTO CHEMICAL COMPANY TOTAL DOLLAR SALES, 1927-1951, TOGETHER WITH A SIX-YEAR MOVING AVERAGE TREND (FIRST AND LAST THREE VALUES ESTIMATED). ARROWS INDICATE TIME OF IDEAL HIGH OF SIX-YEAR CYCLE. RATIO SCALE.

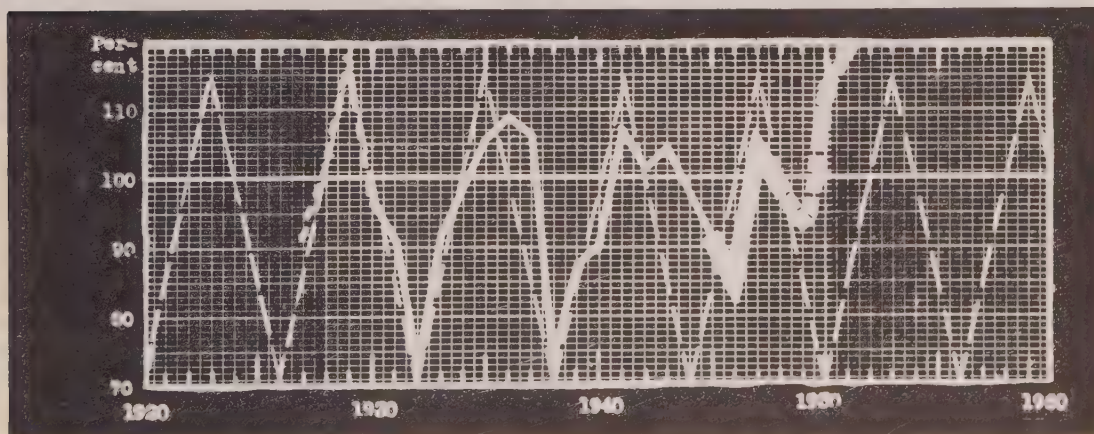


FIG. 2. THE SIX-YEAR CYCLE IN MONSANTO CHEMICAL COMPANY TOTAL DOLLAR SALES. DEVIATIONS OF THE ACTUAL SALES FROM THEIR SIX-YEAR MOVING AVERAGE. BOLD LINE SHOWS HOW THE FORECAST HAS WORKED OUT.

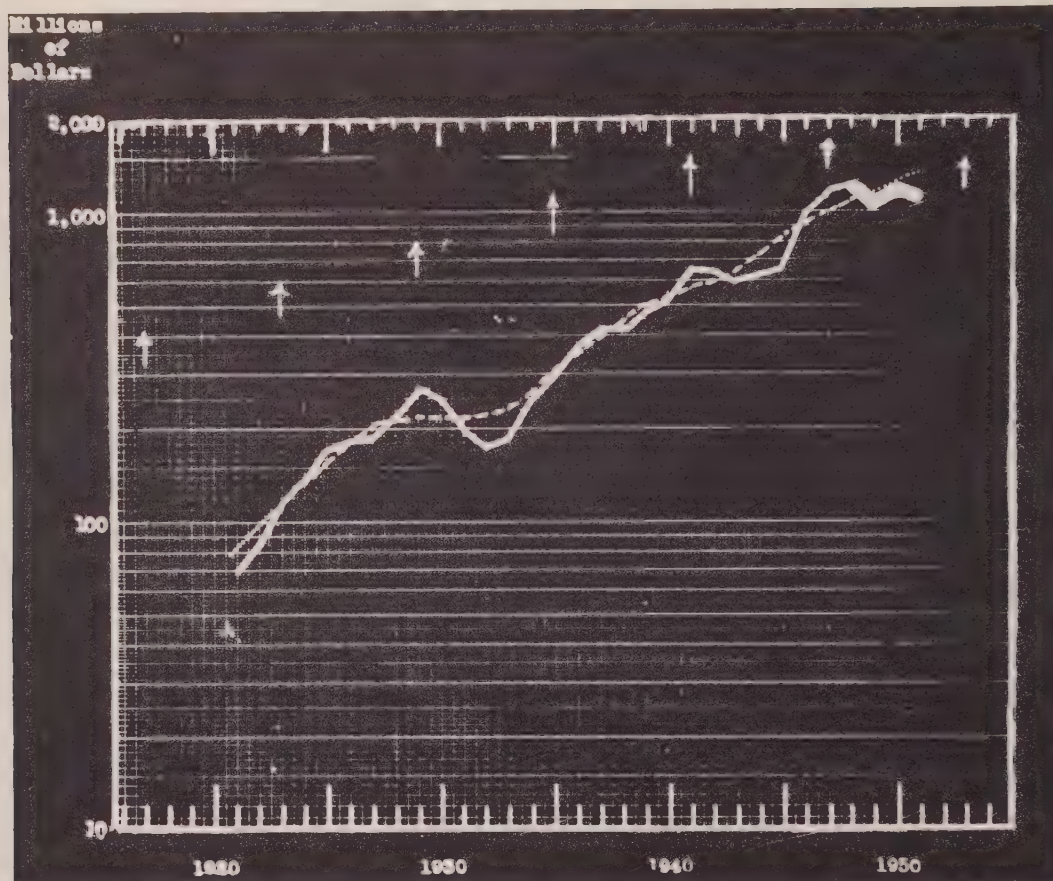


FIG. 1. MONTGOMERY WARD AND COMPANY NET DOLLAR SALES, 1921--1951, TOGETHER WITH A SIX-YEAR MOVING AVERAGE TREND (FIRST AND LAST THREE VALUES ESTIMATED). ARROWS INDICATE TIME OF IDEAL HIGH OF SIX-YEAR CYCLE. RATIO SCALE.

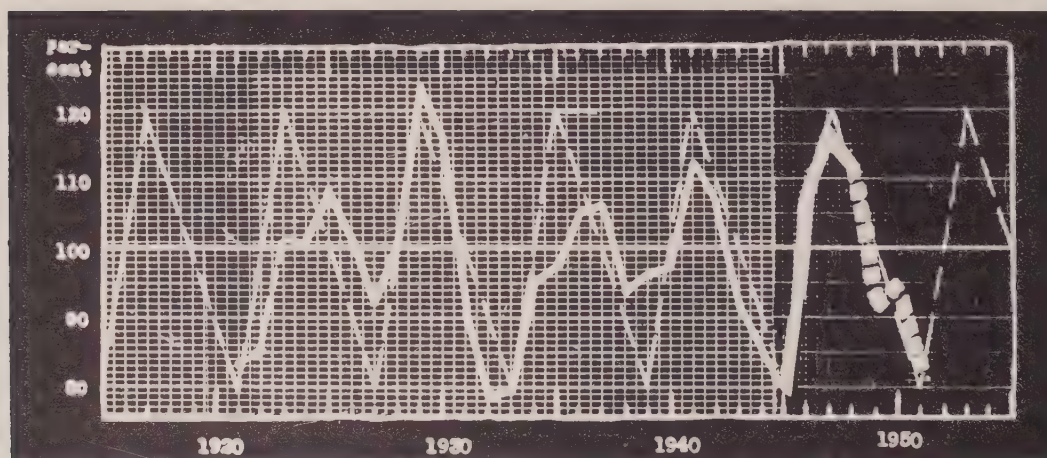


FIG. 2. THE SIX-YEAR CYCLE IN MONTGOMERY WARD AND COMPANY NET DOLLAR SALES. DEVIATIONS OF THE ACTUAL SALES FROM THEIR SIX-YEAR MOVING AVERAGE. BOLD LINE SHOWS HOW THE FORECAST HAS WORKED OUT.

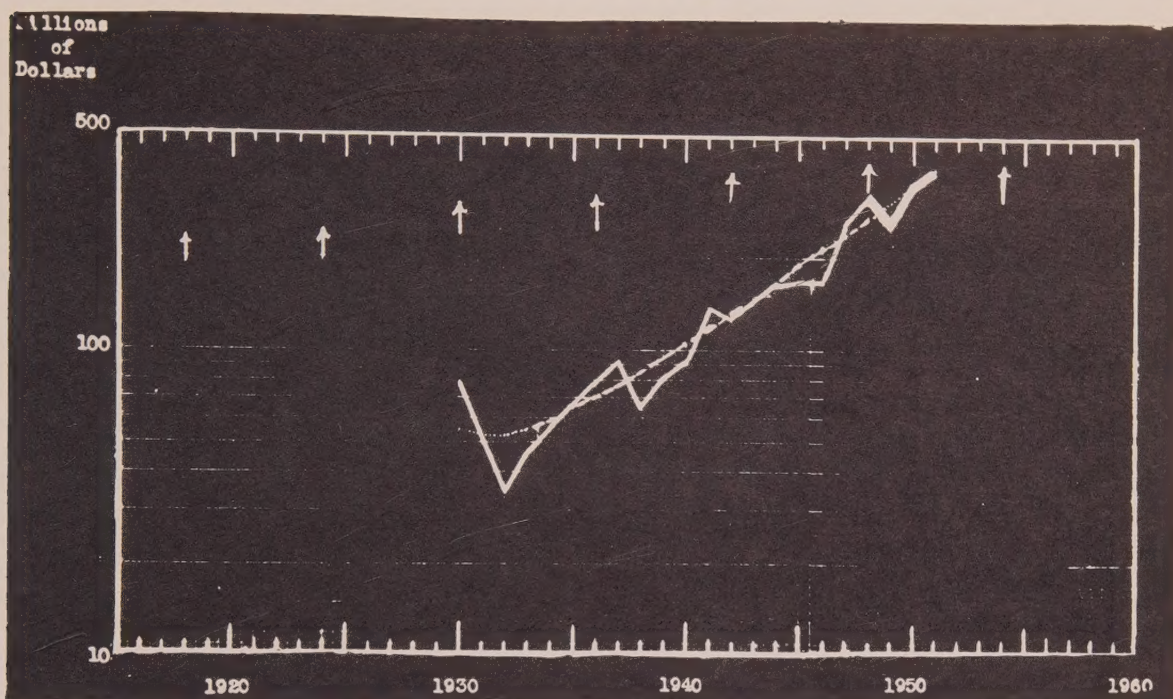


FIG. 1. NATIONAL LEAD COMPANY NET SALES, 1930-1951, TOGETHER WITH A SIX-YEAR MOVING AVERAGE TREND (FIRST AND LAST THREE VALUES ESTIMATED); ARROWS INDICATE TIME OF IDEAL HIGH OF SIX-YEAR CYCLE. RATIO SCALE.

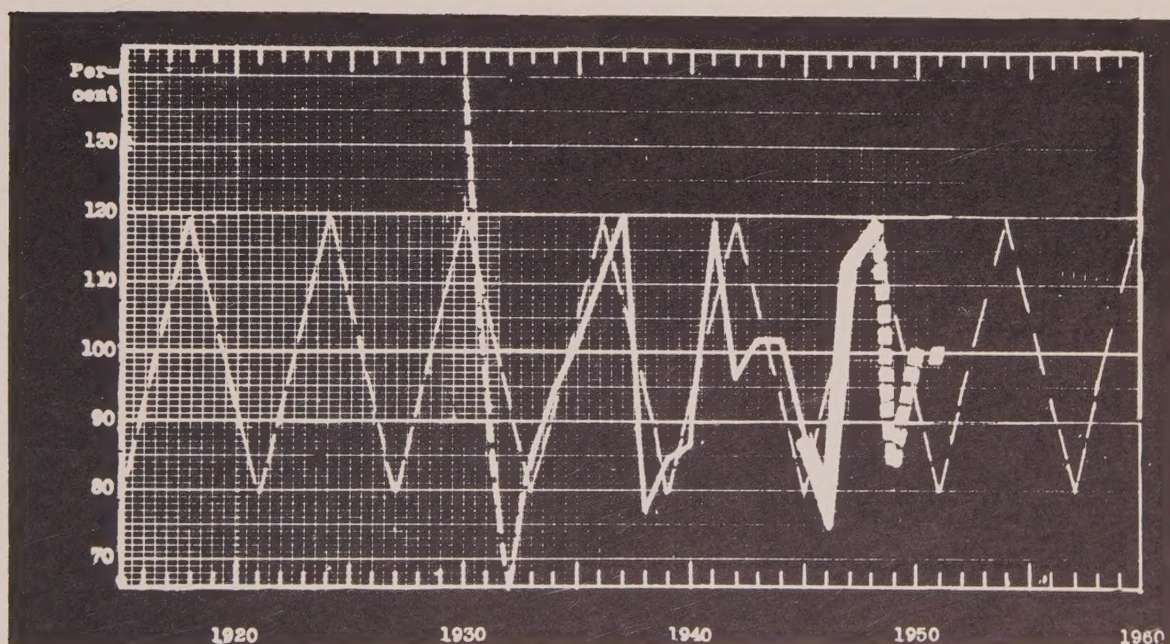


FIG. 2. THE SIX-YEAR CYCLE IN NATIONAL LEAD COMPANY NET SALES. DEVIATIONS OF THE ACTUAL SALES FROM THEIR SIX-YEAR MOVING AVERAGE. BOLD LINE SHOWS HOW THE FORECAST HAS WORKED OUT.

CYCLES IN THE PRICES OF MALLEABLE IRON PIPE FITTINGS

IN my report for December 1951, I gave you a forecast of malleable iron pipe fittings based on a preliminary determination of four component cycles and a trend. This forecast is shown below in Fig. 1 by means of a broken line.

The four cycles were 21 months, 30 months, 41 months, and 44 months long respectively. The trend was in the form of a smooth upward curve getting flatter and flatter toward a point of stability at the end of 1954.

At the time this forecast was made, the latest available prices were those for August 1951 as indicated by the thin solid line in Fig. 1 below.

What has happened from August 1951 through October 1952, the latest date for which figures are available, is shown in Fig. 1 by means of a heavy solid line.

The decline which we have been experiencing for the past year in the price of malleable iron pipe fittings was clearly foretold by the forecast, but the turning point came in August 1951 instead of February 1952 as indicated.

If you read the December 1951 report, you will recall that the cycles in these

figures were determined from figures from January 1924 through July 1927 and figures from January 1933 through December 1948. Figures from August 1927 through December 1932 were not available when the study was made, and figures after December 1948 were discarded voluntarily so that the forecast for 1949, 1950, and 1951 could be compared with actual events. In this connection refer to Fig. 1 which shows the forecast as of December 1948 adjusted for change in trend compared with actual prices. As you can see, the forecast indicated the relative strength in 1949, the relative weakness in 1950, the relative strength in 1951, and the decline which we are now experiencing.

One of the most interesting aspects of the study is the extent to which the behavior called for by the cycles was found to agree with the facts from August 1927 through December 1932 when figures for this period were later discovered in an old journal.

This study is now being revised using all available figures in order to make the most accurate determinations of cycle wave lengths possible.

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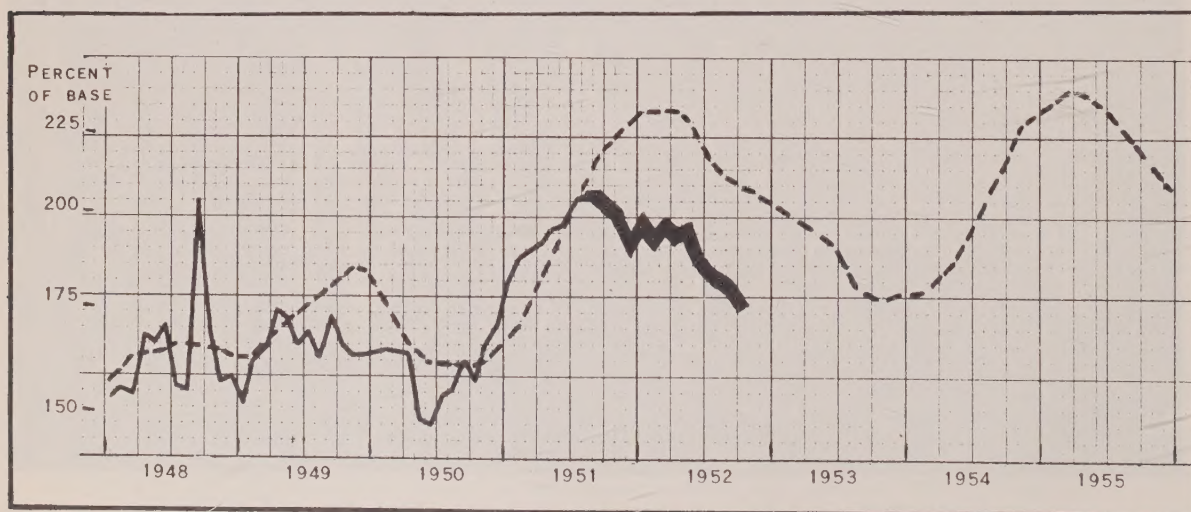


Fig. 1. Broken line shows synthesis of 21, 30, 41, and 44-month cycle and trend as published December 1951. Light solid line shows actual prices to date of previous publication. Heavy solid line shows prices which have become available since.

GLOSSARY

Cycle, coming from a Greek word meaning circle, implies coming around to the place of beginning. Strictly speaking, in the word itself there is no necessary implication of regularity, but the word is often used loosely to denote rhythm or periodicity.

When the word cycle is modified by a time interval such as 6-year cycle, 20-month cycle, 17-day cycle, the phrase usually means a cycle that recurs with reasonable regularity. In other words, it denotes rhythm.

Rhythm, coming from a Greek word meaning measured time, implies a beat, or a tendency toward perfect regularity or periodicity. It is what we really mean on most of the occasions when we use the word cycle.

Cycle analysis, as we are using the term in this bulletin, should really be called rhythm analysis, as we are concerned with **rhythmic cycles**--cycles that recur with a beat.

Periodicity, in the strict sense, is the quality of being regularly recurrent. It is a quality not often found in nature. The ideal cycles which are often added to a chart to diagram a rhythmic cycle are true periodicities.

A **wave** is one single cycle or undulation. Waves have **frequency**, **amplitude**, **period**, and, at least when they represent harmonic curves, **phase**.

Frequency is the number of complete vibrations to and fro--i.e. waves--per second. It is a term not used by cycle analysts when dealing with cycles that are over a second in length.

Amplitude is the extent of a vibratory movement measured from the average position to an extreme position; that is, it is the height or depth of the wave above or below the axis around which the wave oscillates.

Positive amplitude is the distance above the axis, **negative amplitude** is the distance below the axis, **overall amplitude** is the sum of the positive and negative amplitudes. Amplitudes may be expressed in absolute units or as a percentage of the value of the axis.

Period is the interval of time required for a periodic motion to complete a cycle and begin to repeat itself. It is the length of the wave from crest to crest or trough to trough or from some other point on the curve taken as the **epoch**. The **epoch** is the point on the curve chosen as the beginning of the wave. In physics and astronomy it is usually taken as the point where the curve crosses the axis on its upward motion, but it may be any other point as well.

Phase, in a simple harmonic curve, is the point or stage in the period to which the oscillation has advanced considered in relation to a standard position or assumed instant of starting. It is measured along the axis, usually in degrees. By extension of meaning, **positive phase** is therefore the part of the wave above the axis or trend, and **negative phase** is the part of the wave below the axis or trend. When the crests (or troughs) of two or more different series of waves come at the same time, the waves are said to be **in phase** with each other. When the crests of one series of waves coincide with the troughs of another series, the series are spoken of as in **reverse phase**.

A **simple harmonic curve** referred to once or twice above, is the curve you would get by tracing the motion of a pendulum upon a piece of smoked paper that was moving at uniform speed at right angles to the direction in which the pendulum was swaying back

and forth. It is perfectly simple, regular, and symmetrical and, in mathematical study, is usually referred to as a **sine curve**. A single oscillation is called a **sine wave**.

A **rectilinear** or **saw-tooth wave**, on the other hand, is a wave the sides of which are straight lines; in other words, zigzag.

Trend is the tendency of data in a series to increase or decrease during a long period of time. The expression, "a long period of time," cannot be defined except relatively. If you are dealing with hourly figures, you might consider trend as the general direction over the past 30 or 40 hours. With yearly figures "trend" might mean the general tendency over the past 100 years or more.

An **average** is a typical value which tends to sum up or describe a number of figures. There are at least five different kinds of averages commonly used by statisticians; but the one which ordinary folk think about when they hear the word **average** is the one computed by adding all the items together and dividing the total by the number of items. Thus, if we have four items, 10, 12, 11, and 13, the average of these items is $10 + 12 + 11 + 13$ (46) divided by 4, or 11½. An average of this sort is more accurately called the **arithmetic mean**.

An arrangement of numbers is called a **series**.

When the numbers with which we deal represent events which occur one after another in time, the arrangement is called a **time series**. Thus, in the example above, if 10, 12, 11, and 13 represent the price of cotton for each of four consecutive years, or represent the number of accidents on each of four consecutive days, you would call the numbers by this name--a time series.

You could still average the numbers and say, for example, that the average price for all four years was 11½ cents, or that during the period there was an average of 11½ accidents per day, as the case might be.

You could also say that the average price for the first three years was 11 cents, $(10 + 12 + 11)$ (33) divided by 3) and that the average price for the last three years was 12 cents $(22 + 11 + 13)$ (36) divided by 3).

A **moving average** is a succession of averages secured from a series of numbers by dropping the first number (item) in each group averaged and including the next number in the series after the group, thus obtaining the next group to be averaged, and so on.

Thus, when you averaged the first three numbers of our time series (10, 12, and 11) and got 11, and then dropped the first number (10) and added the fourth number (13) and averaged again and got 12, you were constructing a moving average.

Because you were averaging three items at a time, you would call the result a 3-item or 3-term moving average. If the items represented yearly values you would call the result a 3-year moving average. If the items represented daily values, you would call the result a 3-day moving average.

The **moving total** is the series of successive totals from which the moving average is computed. For example: When, above, you added 10, 12, and 11 to get 33, and then added 12, 11, and 13 to get 36 (as a step in the task of getting 11 and 12, the two terms of the moving average), you were computing a moving total.

Summer Fellowship For A Professor

Money is available to enable a member of the teaching staff of a senior college in the United States or abroad to study cycle analysis at Foundation Headquarters at East Brady, Pennsylvania, during the summer vacation of 1953.

If you are interested in this opportunity, write to the Director, Foundation for the Study of Cycles, East Brady, Pennsylvania.